YEAR-BOOK OF PHARMACY

COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS

FROM JULY 1, 1906, TO JUNE 30, 1907,

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FORTY-FOURTH ANNUAL MEETING

HELD IN

MANCHESTER,

JULY, 1907

EDITOR OF THE YEAR BOOK,
J. O. BRAITHWAITE.

EDITORS OF THE TRANSACTIONS,
E. SAVILLE PECK, M.A.
EDMUND WHITE, B.Sc., F.I.C.

LONDON
J. & A. CHURCHILL, 7, GREAT MARLBOROUGH STREET
1907.

BUTLER & TANNER,
THE SELWOOD PRINTING WORKS
FROME, AND LONDON.

BRITISH PHARMACEUTICAL CONFERENCE

OFFICERS FOR 1907-1908.

PRESIDENT.

ROBERT WRIGHT, F.C.S., Buxton.

VICE-PRESIDENTS,

Who have filled the office of President.

JOHN ATTFIELD, PH.D., F.R.S., F.I.C., F.C.S., Watford.
S. R. ATKINS, J.P., Salisbury.
CHAS. UMNEY, F.I.C., F.C.S., London.
N. H. MARTIN, F.R.S.E., F.L.S., Newcastle-on-Tyne.
C. SYMES, PH.D., PH.C., F.C.S., Liverpool.
J. C. C. PAYNE, J.P., M.P.S.I., Belfast.
E. M. HOLMES, F.L.S., PH.C., London.
G. C. DRUCE, M.A., F.L.S., Oxford.
T. H. W. IDRIS, L.C.C., F.C.S., London.
W. A. H. NAYLOR, F.I.C., F.C.S., London.
THOS. TYRER, F.I.C., F.C.S., London.

VICE-PRESIDENTS.

J. R. YOUNG, Warrington.
G. LUNAN, Edinburgh.
J. A WALSH, L.R.C.P., Edin., Dublin.
W. GILES, Aberdeen.
F. RANSOM, F.C.S , Hitchin.
HENRY G. GREENISH, F.I.C., F L.S., London.

HONORARY TREASURER.

J. C. UMNEY, F.C.S., London.

HONORARY GENERAL SECRETARIES.

E. SAVILLE PECK, M.A., Cambridge.
EDMUND WHITE, B.Sc., F.I.C., London.

HONORARY LOCAL SECRETARY.

W. REID, Aberdeen.

OTHER MEMBERS OF THE EXECUTIVE COMMITTEE.

F. H. ALCOCK, Birmingham.
H. FINNEMORE, London.
J. P. GILMOUR, Glasgow.
E. F. HARRISON, London.
J. S. HILLS, London.
D. LLOYD HOWARD, London.
W KIRKBY, Manchester.
W. H. MARTINDALE, London.
J. F. TOCHER, Peterhead.

These Officers collectively constitute the Executive Committee.

ASSISTANT SECRETARY.

JOHN HEARN, London.

AUDITORS.

J. W. BOWEN, London, and W. P. ROBINSON, London.

HONORARY COLONIAL SECRETARIES.

BENGAL	W. T. GRICE, F.C.S., Calcutta.
CANADA	J. BEMROSE, F.C.S., Montreal.
CAPE COLONY AND NATAL . .	A. WALSH, Port Elizabeth.
MADRAS .	W. E. SMITH, Madras.
NEW ZEALAND	R. WILKINSON, Dunedin.
QUEENSLAND	STILES W. G. RICH, Brisbane.
VICTORIA .	H. SHILLINGLAW, Melbourne.
WEST INDIES	A. JAMES TAITT, Port of Spain.

BRITISH PHARMACEUTICAL CONFERENCE

INAUGURAL MEETING HELD AT NEWCASTLE-ON-TYNE IN 1863.

Years.	*Places of Meeting.*	*Presidents.*	*Vice-Presidents.*	*Local Secretaries*
1864	Bath . . .	HENRY DEANE, F.L.S.	Prof. BENTLEY. F.L.S. Dr. EDWARDS, F.C.S. R. W. GILES, F.C.S. Prof. REDWOOD, F.C.S.	J. C. POOLEY
1865	Birmingham	HENRY DEANE, F.L.S.	Prof. BENTLEY, F.L.S. Dr. EDWARDS, F.C.S. W. SOUTHALL. J. P. TYLER.	W. SOUTHALL, Jun.
1866	Nottingham	Prof. BENTLEY, F.L.S.	Dr. EDWARDS, F.C.S. D. HANBURY, F.R.S. SAMUEL PARR. W. W. STODDART, F.G.S.	J. H. ATHERTON F.C.S.
1867	Dundee . .	Prof. BENTLEY, F.L.S.	D. HANBURY, F.R.S. J. INCE, F.L.S. D. RUSSELL. W. W. STODDART, F.G.S.	J. HODGE.
1868	Norwich .	DANIEL HANBURY, F.R.S.	R. FITCH, F.G.S. J. INCE, F.L.S. W. W. STODDART, F.G.S. J. R. YOUNG.	F. SUTTON, F.C.S.
1869	Exeter . .	DANIEL HANBURY, F.R.S.	G. COOPER. H. S. EVANS, F.C.S. J. INCE, F.L.S. W. W. STODDART, F.G.S.	M. HUSBAND.
1870	Liverpool .	W. W. STODDART, F.C.S.	J. ABRAHAM. H. C. BAILDON. H. S. EVANS, F.C.S. J. INCE, F.L.S.	E. DAVIES, F.C.S. J. DUTTON (Birkenhead).
1871	Edinburgh .	W. W. STODDART, F.C.S.	J. ABRAHAM. H. C. BAILDON. J. INCE, F.L.S. J. WILLIAMS, F.C.S.	J. MACKAY, F.C.S.
1872	Brighton	H. B. BRADY, F.R.S.	J. INCE, F.L.S. R. REYNOLDS, F.C.S. W. D. SAVAGE. J. WILLIAMS, F.C.S	T. GLAISYER.
1873	Bradford .	H. B. BRADY, F.R.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. F. M. RIMMINGTON, F.C.S. J. WILLIAMS, F.C.S.	R. PARKINSON, Ph.D.
1874	London . .	THOS. B. GROVES, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. CHAS. H. SAVORY. J. WILLIAMS, F.C.S	M. CARTEIGHE, F.C.S.
1875	Bristol . .	THOS. B. GROVES, F.C.S.	T. H. HILLS, F.C.S R. REYNOLDS, F.C.S. CHAS. BOORNE. PETER SQUIRE, F.L.S.	J. PITMAN.
1876	Glasgow .	Prof. REDWOOD, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. E. C. C. STANFORD, F.C.S. D. FRAZER.	A. KINNINMONT.
1877	Plymouth .	Prof. REDWOOD, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. A. P. BALKWILL. J. WILLIAMS, F.C.S	R. J. CLARK.
1878	Dublin . .	G. F. SCHACHT, F.C.S.	Prof. TICHBORNE, F.C.S. R. REYNOLDS, F.C.S. R. W. PRING, L.A.H.D. J. WILLIAMS, F.C.S.	W. HAYES.
1879	Sheffield .	G. F. SCHACHT, F.C.S.	Prof. TICHBORNE. F.C.S. R. REYNOLDS, F.C.S. W. WARD, F.C.S. J. WILLIAMS, F.C.S	H. MALEHAM.
1880	Swansea .	W. SOUTHALL, F.L.S.	R. REYNOLDS, F.C.S. G. W. SANDFORD. W. WARD, F.C.S. N. M. GROSE.	J. HUGHES.
1881	York . .	R. REYNOLDS, F.C.S.	Prof. ATTFIELD, F.R.S. R. DAVISON. N. M. GROSE. C. UMNEY, F.C.S.	J. SOWRAY.

BRITISH PHARMACEUTICAL CONFERENCE

Years.	*Places of Meeting.*	*Presidents.*	*Vice-Presidents.*	*Local Secretaries*
1882	Southampton	Prof. ATTFIELD, F.R.S.	R. CHIPPERFIELD. T. GREENISH, F.C.S. Prof. TICHBORNE, LL.D. J. R. YOUNG.	O. R. DAWSON.
1883	Southport .	Prof. ATTFIELD, F.R.S.	M. CARTEIGHE, F.C.S. W. V. RADLEY. C. UMNEY, F.C.S. J. R. YOUNG.	WM. ASHTON.
1884	Hastings .	J. WILLIAMS, F.C.S.	S. R. ATKINS. J. BELL. M. CARTEIGHE, F.C.S. J. R. YOUNG.	F. ROSSITER.
1885	Aberdeen .	J. B. STEPHENSON.	F. B. BENGER, F.C.S. M. CARTEIGHE, F.C.S. C. EKIN, F.C.S. J. P. KAY.	A. STRACHAN.
1886	Birmingham	T. GREENISH, F.C.S.	T. BARCLAY. F. B. BENGER, F.C.S. M. CARTEIGHE, F.C.S C. EKIN, F.C.S.	CHAS. THOMPSON
1887	Manchester	S. R. ATKINS, J.P.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. G. S. WOOLLEY.	F. B. BENGER, F.C.S.
1888	Bath . .	F. B. BENGER, F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. W. MARTINDALE, F C.S	H. HUTTON.
1889	Newcastle-on-Tyne	C. UMNEY, F.I.C., F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. N. H. MARTIN, F.L.S.	T. M. CLAGUE.
1890	Leeds . .	C. UMNEY, F.I.C., F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. A. KINNINMONT, F.C.S. W. SMEETON.	F. W. BRANSON, F.C.S.
1891	Cardiff . .	W. MARTINDALE, F.C.S.	M. CARTEIGHE, F.C.S. A. KINNINMONT, F.C.S. J. C. THRESH, M.B.,D.Sc. J. MUNDAY.	ALFRED COLEMAN.
1892	Edinburgh . .	E. C. C. STANFORD, F.C.S.	M. CARTEIGHE, F.C.S. W. GILMOUR, F.R.S E. J. C. THRESH, M.B.,D.Sc. J. R. YOUNG, J.P.	PETER BOA.
1893	Nottingham	OCTAVIUS CORDER.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. W. HAYES. R FITZ HUGH.	C. A. BOLTON
1894	Oxford . .	N. H. MARTIN, F.L.S., F.R.M.S.	M. CARTEIGHE, F.C.S. R. H. DAVIES, F.C.S W. HAYES. G. T. PRIOR.	H. MATHEWS.
1895	Bournemouth	N. H. MARTIN, F.L.S., F.R.M.S.	M. CARTEIGHE, F.C.S J. LAIDLAW EWING. W. HAYES. J. A. TOONE.	STEWART HARDWICK.
1896	Liverpool .	W. MARTINDALE, F.C.S.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. M. CONROY, F.C.S. W. HAYES.	T. H. WARDLEWORTH. H. O. DUTTON (Birkenhead).
1897	Glasgow .	Dr. C. SYMES, Ph.C.	WALTER HILLS. J. LAIDLAW EWING. W. F. WELLS. R. MCADAM.	J. A. RUSSELL.
1898	Belfast . .	Dr. C. SYMES, Ph.C.	WALTER HILLS. J. LAIDLAW EWING. J. C. C. PAYNE, J.P. W. F. WELLS.	R. W. MCKNIGHT W. J. RANKIN.
1899	Plymouth .	J. C. C. PAYNE, J.P., Ph.C.	WALTER HILLS, F.C.S. R. J. DOWNES. JOHN MOSS, F.I.C., F.C.S. C. J. PARK.	J. DAVY TURNEY.

BRITISH PHARMACEUTICAL CONFERENCE

Years	*Places of Meeting.*	*Presidents*	*Vice-Presidents.*	*Local Secretaries.*
1900	London	E. M. HOLMES, F.L.S. Ph.C.	R. J. DOWNES, Ph.C. WALTER HILLS, F.C.S. JOHN MOSS, F.I.C., F.C.S. J. F. HARRINGTON, Ph.C.	W. WARREN. HERBERT CRACKNELL.
1901	Dublin	G. C. DRUCE, M.A., F.L.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. PETER BOA, F.C.S. Prof. TICHBORNE, Ph.D.	J. I. BERNARD.
1902	Dundee	G. C. DRUCE, M.A., F.L.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. CHAS. KERR. W. A. H. NAYLOR, F.I.C., F.C.S.	W. CUMMINGS.
1903	Bristol	T. H. W. IDRIS, F.C.S	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. PETER BOA. W. A. H. NAYLOR, F.I.C., F.C.S. J. W. WHITE.	H. E. BOORNE.
1904	Sheffield	T. H. W. IDRIS, F.C.S.	G. D. BEGGS, M.P.S.I. D. B. DOTT, F.R.S.E., F.I.C. W. A. H. NAYLOR, F.I.C., F.C.S. G. T. W. NEWSHOLME, F.C.S. F. RANSOM, F.C.S.	H. ANTCLIFFE.
1905	Brighton	W. A. H. NAYLOR, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. J. MONTGOMERY. W. H. GIBSON. F. RANSOM. H. G. GREENISH.	W. W. SAVAGE. C. G. YATES.
1906	Birmingham	W. A. H. NAYLOR, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. W. F. WELLS. F. RANSOM. H. G. GREENISH. T. BARCLAY.	C. THOMPSON.
1907	Manchester	THOS. TYRER, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. J. A. WALSH. F. RANSOM. H. G. GREENISH. G. S. WOOLLEY.	•W. KIRKBY.
1908	Aberdeen	ROBT. WRIGHT, F.C.S.	J. R. YOUNG. G. LUNAN. J. A. WALSH. W. GILES. H. G. GREENISH. F. RANSOM.	W. REID

TREASURERS (One).

1863 to 1870, H. B. BRADY, F.R.S.
1870 to 1877, GEORGE F. SCHACHT, F.C.S.
1877 to 1884, C. EKIN, F.C.S.
1884 to 1888, C. UMNEY, F.I.C., F.C.S.
1888 to 1890, W. MARTINDALE, F.C.S.
1890 to 1893, R. H. DAVIES, F.I.C., F.C.S.
1893 to 1898, JOHN MOSS, F.I.C., F.C.S.
1898 to 1908, JOHN C. UMNEY, Ph.C., F.C.S.

HONORARY GENERAL SECRETARIES (Two).

1863 to 1880, Prof. ATTFIELD, Ph.D., F.R.S.
1863 to 1871, RICHARD REYNOLDS, F.C.S.
1871 to 1884, F. BADEN BENGER, F.C.S.
1880 to 1882, M. CARTEIGHE, F.C.S.
1882 to 1886, SIDNEY PLOWMAN, F.R.C.S.
1884 to 1890, JOHN C. THRESH, M.B., D.Sc.
1886 to 1901, W. A. H. NAYLOR, F.I.C., F.C.S.
1890 to 1903, F. RANSOM, F.C.S.
1901 to 1908, E. SAVILLE PECK, M.A.
1903 to 1908, EDMUND WHITE, B.Sc., F.I.C.

LOCAL CORRESPONDING SECRETARIES.

District.	*Name.*
Aberdeen	W. Giles.
Barnet	R. F. Young.
Belfast	W. J. Rankin.
Birmingham	C. Thompson.
Blackburn	R. Lord Gifford.
Bournemouth	Stewart Hardwick.
Bradford	J. Jackson.
Bridge of Allan	J. Bain.
Brighton and Hove	R. A. Cripps.
Bristol	H. E. Boorne.
Burton-on-Trent	G. Wright.
Buxton	R. Wright.
Cambridge	E. Saville Peck.
Carlisle	J. Hallaway.
Cheltenham	F. J. Palmer.
Chester and Wrexham	W. F. J. Shepheard.
Chislehurst	J. G. Prebble.
Cork	T. R. Lester.
Coventry	H. W. Jones.
Derby	S. Taylor.
Doncaster	M. H. Stiles.
Dublin	W. F. Wells.
Dundee	Wm. Cummings.
Eastbourne	S. Gibbs.
Edinburgh	Peter Boa.
Exeter	H. Wippell Gadd.
Glasgow	W. L. Currie.
Godalming	J. H. Mather.
Harrogate	J. H. Wilson.
Hastings and St. Leonards	F. Rossiter.
Hertford	G. S. Durrant.
Hitchin	F. Ransom.
Ilkley	G. W. Worfolk.
Ipswich	E. C. Sayer.
Kendal	G. Vogt.
Kettering	W. Hitchman.
Kilmarnock	G. F. Merson.
Kirkcaldy	David Storrar.
Leamington	H. Hutton.
Leeds	F. P. Sargeant.
Leicester	Lewis Ough.
Liverpool	R. C. Cowley.
Malvern	A. Mander.
Manchester	C. A. Johnstone.
Montrose	A. Davidson.
Morpeth	J. Whittle.
Newcastle-on-Tyne	T. Maltby Clague.
Newport (Mon.)	E. Davis.
Nottingham	G. J. R. Parkes.
Nuneaton	G. Iliffe.
Oxford	G. Claridge Druce.
Paisley	A. Fraser.
Peterhead	J. F. Tocher.
Plymouth	J. Davy Turney.
Ross (Hereford)	T. Matthews.
Salisbury	S. R. Atkins.
Sheffield	G. T. W. Newsholme.
Shrewsbury	W. G. Cross.
Southampton	H. Wilson.
Southport	J. Righton.
Spalding	E. Wightman Bell.
Stockport	J. C. Arnfield.
Stockton	W. J. Clarke.
Sunderland	C. Ranken.
Swansea	N. M. Grose.
Taunton	W. A. Wrenn.
Torquay	E. Quant.
Tunbridge Wells	A. E. Hobbs.
Warrington	J. Rymer Young.
Wolverhampton	F. J. Gibson.
Worcester	C. W. Turner.

The duties the Local Corresponding Secretaries have undertaken to discharge are briefly as follows:—

(*a*) To bring under the notice of pharmacists, principals, and their assistants, in their districts, who are unassociated with the Conference, the advantage of membership with it, and by personal effort to try and induce them to join.

(*b*) To assist in stimulating research by asking pharmacists, who have the time, ability, and disposition, to contribute from time to time a paper or useful note to the annual meetings.

(*c*) To endeavour to induce defaulters to continue their membership

(*d*) To take generally a watchful and sympathetic interest in the affairs of the Conference.

To render those services voluntarily at times convenient to themselves and as opportunity offers.

THE

BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

THE most important ways in which a member can aid the objects of the Conference are by introducing new members, suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is published early in the year (see page 293). Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meeting for 1908 will be held at Aberdeen.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretaries, or any other officer or member. The yearly subscription is payable in advance, on July 1st. The amount, which includes free delivery of the Year-Book, is fixed at a minimum of 7*s*. 6*d*. for members residing within the Postal Union. Further information may be obtained from

THE ASST. SECRETARY, BRIT. PHARM. CONF.,
17, Bloomsbury Square, London, W.C.

THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of 300 to 600 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 298.

CHEMISTRY

YEAR-BOOK OF PHARMACY

PART I

CHEMISTRY

Absinthe, Essential Oil of, Turbidity Test with Water to Detect the Presence of in Liqueurs. Sanglé Ferrière and L. Cuniasse. (*Journ. Pharm. Chim.* [6], **25,** 428.) The prevailing agitation in France concerning the ill effects of "absinthe" drinking, has led to the suggestion that the sale of all liqueurs which develop a turbidity when diluted with water should be prohibited. The authors point out that any such regulation would be valueless, since many perfectly harmless essential oils, notably those containing anethol, give a more copious precipitation when their alcoholic solutions are diluted than the harmful thujone-containing oils such as those of wormwood and tansy. Experiments were made with 3 per mille. solutions in alcohol, 70 per cent., of those oils which are most used in compounding liqueurs of the "absinthe" class. One volume of this solution was diluted with 2 volumes of distilled water; the turbidity was then measured in a diaphanometer. The following figures indicate the height of the liquid in m.m. with the oils indicated at which the lines on the screen of the instrument became illegible:—Wormwood, 40·4; tansy, 53·0; hyssop, 34; coriander, 34; fennel, 12·0; star-anise, 3 4; aniseed, 2·2. It is evident that by this test the harmless oils would be condemned rather than those which are toxic.

Absolute Alcohol, Preparation of, with Metallic Calcium. (*Apoth. Zeit.*, **12,** 1008.) A patent has been taken out for dehydrating alcohol by means of metallic calcium. Ordinary alcohol 94 to 96 per cent. is first warmed with 5 per cent. of calcium filings,

then distilled. The distillate will consist of alcohol 99 or 99·5. This may be rendered absolute by redistilling over 2 per cent. of calcium filings.

Acacia farnesiana, French, Essential Oil of the Flowers of. (*Schimmels' Report*, April, **1907**, 26.) The oil obtained from French flower "extract" which yielded 5·65 per cent., had the following characters:—Sp. gr., 1·0575; α_D − 0° 30′; $n_{D22°}$ 1·51500; acid value, 25·4; ester value, 229. (See also *Year-Book*, **1903**, 19.)

Acetanilide, or Phenacetin, Method for the Determination of in Mixtures. J. L. Turner and C. E. Vanderkleed. (*Amer. Journ. Pharm.*, **79**, 151.) The process depends on the determination of the acetic acid formed on saponifying acetanilide with alcoholic KOH solution. To determine the amount present in a liquid mixture, a known volume is evaporated to drive off any alcohol which may be present and the residue is shaken out with four successive washings of $CHCl_3$. The bulked $CHCl_3$ solutions are evaporated on an Erlenmeyer flask on the water bath; a little ether being added and evaporated from the residue to remove the last traces of chloroform. It is then saponified by boiling for 1½ to 2 hours under a reflux condenser, with NaOH 3 Gm.; alcohol, 20 c.c., and water, 10 c.c. The alcohol is then distilled off, and the aqueous residue is shaken out with ether to remove the liberated aniline. The ethereal solution is washed twice with water, the washings being added to the original alkaline aqueous liquid. This is then transferred to a litre flask, acidified with 25 c.c. H_3PO_4 85 per cent. and slowly distilled with steam, the flask being fitted with a splash trap. The whole of the acetic acid will generally have come over when 800 to 1,000 c.c. of distillate have been collected. This is then titrated in the usual manner with N/NaOH solution, each c.c. of which =0·13409 Gm. of acetanilide. The same method is applicable to the determination of phenacetin; 1 c.c. of N/NaOH solution being equivalent to 0·17779 Gm. To determine the amount in surgical dressings a known weight of the material is extracted with $CHCl_3$ in a Soxhlet's apparatus; after distilling off the $CHCl_3$, the residue is treated as above. When salol is present as well as acetanilide, the aqueous solution, after acidifying with phosphoric acid is shaken out with ether to remove the liberated phenol; this ether is washed with

water to prevent loss of acetic acid, the washings being added to the aqueous liquid before titration.

Achlys triphylla, Coumarin in. C. E. Bradley. (*Journ. Amer. Chem. Soc.*, 1907, **29**, 606.) This plant, N.O. Berberidacæ, a native of the Pacific Coast of North America, and extending from British Columbia to California, has been added to the list of those yielding coumarin. One of its popular names is "wild vanilla," on account of the odour it gives off when dry; it is also known as "elk weed." The dry plant yields 0·2 per cent. of coumarin.

Aconitine, New Reaction of. N. Monti. (*Gaz. Chim. Ital.*; *Répertoire* [3], **18**, 511.) From 0·0002 to 0·001 Gm. of the alkaloid is mixed with 2 to 4 drops of H_2SO_4 (sp. gr. 1·75) and warmed for 5 minutes on the water bath. A crystal of resorcin about equal in weight to the aconitine taken is then added and heating continued. The liquid becomes at first yellowish red then red-violet, which acquires its maximum intensity in about 20 minutes and is very stable. No other alkaloid has been found to give a similar reaction.

Adrenaline, Characteristic Odour—Reaction of. A. Gunn and E. F. Harrison. (*Pharm. Soc.* [4], **24**, 718.) When a particle of adrenaline or a few drops of the 1:1,000 solution is treated with excess of NaOH a peculiar odour almost exactly resembling that of PH_3 is evolved. It is given by the synthetic base as distinctly as by that derived from suprarenal capsules. It is very distinct when 1 drop of 1:1000 solution is treated with 5 drops of 10 per cent. NaOH solution.

Albuminoids and Gelatin, Determination of, by Means of Acetone. F. Bordas and — Touplain. (*Annales Chim. Analyt.*, **11**, 365.) Egg albumin, fibrin, casein and gelatinous bodies are quantitatively precipitated by acetone, which at the same time acts as a solvent on fats and resins so that albuminoids may be readily separated by means of that solvent. The solutions operated on should be neutral or only faintly acid or alkaline.

Determination of Casein in Butter.—10 Gm. of butter is extracted with pure acetone; the residue is washed with aqueous acetone, dried, and weighed. This weight, less the amount of ash found on incinerating, gives the casein. *Cheese.* About

2 Gm. is weighed off, disintegrated in 5 to 10 c.c. of water, then treated with 30 to 35 c.c. of pure acetone, added gradually and with agitation. The precipitate is collected, washed first with dilute, then with pure acetone, dried and weighed. The weight, less that of the ash, is casein. *Milk.* 10 c.c. of milk is poured into 20 c.c. of acetone; the precipitate, separated by centrifugation, is treated as above.

Alcohols and Phenols, Determination of the Molecular Weight of, by Means of Benzoic Anhydride. A. Gascard. (*Journ. Pharm. Chim.* [6], **24,** 97.) When alcohols or phenols are heated with excess of benzoic anhydride, they are esterified, and for each molecule of ester formed a molecule of benzoic acid is liberated. The ethereal solution of the products of reaction may then be titrated with N/KOH solution, since, under these conditions, only the free acid is attacked by the alkali. The equation is thus expressed—

$$R.OH + \begin{matrix} C_6H_5 . CO \diagdown \\ \quad O \\ C_6H_5 . CO \diagup \end{matrix} = \begin{matrix} C_6H_5 . COOR \\ + \\ C_6H_5 . COOH. \end{matrix}$$

A known weight of the dried alcohol or phenol is introduced with an excess of benzoic anhydride into a dry flask with a long neck; this is then sealed in the blow-pipe, and the flask, weighted with a lead ring, is wholly immersed in a water, oil, or $CaCl_2$ bath, according to the temperature to which it is to be heated. This must always be at least that of the m.p. of the alcohol under examination. Generally that of 120°C., attained by a $CaCl_2$ bath is sufficient. The mixture is then heated for several hours, the flask being kept wholly submerged. When reaction is complete, and the contents of the flask are cold, the seal is broken and 10 or 20 c.c. of ether is run down the neck and sides of the vessel to wash down any sublimed benzoic acid. Five c.c. of water is then added, and titration performed with phenolphthalein indicator, in the usual manner with N/KOH solution. When w is the weight of the substance taken, N the number of c.c. of N/KOH used up the molecular weight of the body will be $w \times \frac{1,000}{N}$. A blank experiment with the same quantity of reagents should be performed simultaneously and the amount of N/KOH used up in this deducted

before making the above calculation. When a polyatomic alcohol is in question, the result obtained must necessarily be multiplied by the number of the alcoholic functions concerned in the reaction. Where an acid, as in the case of salicylic acid, is concerned, the result must be multiplied by two. When benzoic esters are formed which are but sparingly soluble in ether, C_6H_6 or $CHCl_3$ may be employed as solvents. This occurs with alcohols of high molecular weight. It is claimed that the method is simpler and quicker than the ordinary method of saponification.

Alkaloidal Assays of Aconite, Ipecacuanha, Fluid Extracts, and Extract of Physostigma. H. M. Gordin. (*Proc. Amer. Pharm. Assoc.*, **1906**, 377.) For efficacy in separating immiscible solvents after shaking out, and to avoid loss by transferring alkaloidal solutions from one vessel to another, two simple forms of apparatus are described and figured. The first is a separator, similar to that generally employed, but with two tapped withdrawal tubes instead of one, inserted at a slight angle near the bottom of a globular stoppered funnel. The second is also a modification of the separator, with one convex side, the upper side being slightly concave; one extremity bears the usual glass cock withdrawing tube, the other extremity a swan-neck rising from the upper surface and fitted with a stopper. The latter vessel obviates the necessity of transferring the alkaloidal solution into a distilling flask. By attaching the swan neck to a condenser the volatile solvent may be distilled off. Drawings of these two simple appliances are given.

Aconite Root. Ten Gm. of the powdered drug is treated in a percolator-shaking tube (*Year-Book*, **1906**, 59) with 50 c.c. of a mixture of 3 vols. of ether and 1 vol. of chloroform and 5 c.c. of 10 per cent. Na_2CO_3 solution. The whole is thoroughly shaken for 1 hour, then percolated with the same solvent to exhaustion, the stopcock of the percolator passing through a wide cork into a small funnel, to which the cork serves as a cover. The funnel contains a double filter through which the percolate passes, preferably into the swan-neck separator above described. It is then concentrated by evaporation to about one half to remove traces of AmOH, and when cold again made up to the original volume with ether. It is then shaken out with standard acid; and washed twice with water; the excess of acid is then titrated in the usual way. As a gravimetric check,

the bases, after titration, may be liberated with NaOH shaken out with $CHCl_3$, the solvent evaporated and the residue weighed. By the volumetric method a good sample of aconite gave 1·02 per cent. of alkaloids.

Ipecac Root. Five Gm. ipecac (No. 60 powder) are placed in the shaking tube, add 2·5 c.c. of a 10 per cent. solution of Na_2CO_3 and 25 c.c. of the same immiscible solvent as was used for aconite. After shaking one hour percolate to exhaustion. Shake out percolate three times with small quantities of very dilute H_2SO_4, add excess of NaOH and shake out three times with chloroform-ether. Distil the ethereal solution to about one-half, dilute with ether to about original volume and finish as with aconite root.

A good sample of ipecac assayed by this method gave 2·55 per cent. alkaloid.

An attempt to assay belladonna leaves by this method showed that the leaves cannot be exhausted if Na_2CO_3 is used. (NaOH was not tried.)

Fluid Extracts. These were assayed as follows :—

From 5 to 20 c.c. of the fluid extract were shaken out three times with the immiscible solvents, using 30, 20 and 20 c.c. and making the liquid alkaline with 10 per cent. solution of Na_2CO_3 in the special separating funnel. The immiscible solvent was filtered into the swan-neck separatory funnel and after concentration to about one half and dilution with ether shaken out with excess of standard acid and then washed twice with water. The excess of acid was titrated in the usual way. The whole volumetric assay of a fluid extract by this method occupies about two hours. The method works very well with the following fluid extracts : Aconite root, belladonna root, coca leaves and ipecac root. For ipecac 5 c.c. and for belladonna root 20 c.c. were taken ; for aconite or coca 10 c.c. were taken.

The solvent employed was ether 2 vols., petroleum ether 1 vol. By this method the following percentages of alkaloids were obtained from the respective fluid extracts : Aconite, 1·20 per cent. ; coca, 0·76 per cent. ; belladonna root, 0·60 per cent. ; ipecacuanha, 1·80 per cent.

Fluid Extract of Jaborandi. To ten c.c. of the fluid extract in a separator, 10 c.c. of saturated K_2CO_3 solution is added and mixed ; the liquid is then shaken out three times with a mixture of ether 3 and chloroform 1, using 40 c.c. each time. The

ethereal liquid is filtered into a flask (preferably the swan-neck separator) concentrated to one half, made up to the original volume with ether, shaken out with a known volume, in excess, of standard acid and the remaining free acid titrated in the usual way. The sample examined gave 0·51 per cent. of alkaloid.

Fluid Extract of Cinchona. Five c.c. of the fluid extract in a separator (preferably the special form) is treated with 2 c.c. of 10 per cent. NaOH solution, and shaken out three times with a mixture of ether 3 vols., chloroform 1 vol., using 25 c.c. each time. The ethereal solution is filtered into another separator and shaken out three times with dilute H_2SO_4. The alkaloids are liberated from the acid solution with any alkali, and shaken out with $CHCl_3$. The $CHCl_3$ extract is evaporated in a tared dish; the residue dried at 100° is weighed. The sample examined gave 4·8 per cent. of alkaloids.

Extractum Physostigmatis. Dissolve 2 Gm. of the solid extract placed in a small evaporating dish in about 10 c.c. of cold water acidulated with 5 drops of dilute acetic acid, and transfer the turbid liquid to a 25 c.c. measuring flask. Wash the dish with small quantities of water and make up the liquid to 25 c.c. Filter through a dry filter and by means of a pipette, transfer 12·5 c.c. of the filtrate to the special two-tapped separating funnel. To the contents of the funnel add 10 c.c. of a saturated solution of $NaHCO_3$ and 100 c.c. of a mixture of 1 volume of petroleum ether and 3 volumes of ether. Shake thoroughly for a minute or so, draw off the alkaline aqueous liquid and throw it away, then filter the ethereal solution into the swan-neck separating funnel through a plain double filter of ordinary paper having four folds on each side. Wash the first separating funnel and the filter repeatedly with more of the immiscible solvent and concentrate the ethereal liquid to about one-half. Cool, dilute with ether and shake out first with excess of standard acid and then twice with water. Titrate excess of acid with standard alkali, using hematoxylin as indicator. The acid liquid is perfectly colourless and the end reaction is exceptionally sharp.

A higher yield of alkaloid can be obtained by substituting chloroform for the petroleum ether in the above immiscible solvent. In this case, too, the method works well and the end reaction is very sharp. But neither method gives the amount of all the alkaloids in the drug, which could only be obtained by repeated extraction with chloroform. As this is inconvenient

the results obtained by either of the above methods could be adopted as official standard.

A sample examined of the stated strength 5 00 per cent., by first method 4·20 per cent., by second method 4·91 per cent., was found to be 4·2 per cent. by the first method and 4·91 per cent. by the second.

Aldehydes, New Reagent for. E. Feder. (*Archiv. d. Pharm.*, **135,** 25.) Two solutions are required, one containing 20 Gm. of $HgCl_2$ in a litre of water and the other 100 Gm. of Na_2SO_3 and 80 Gm. of NaOH in a litre. Equal volumes are mixed when required, the alkaline solution being quickly added to the mercuric solution. The reagent is very sensitive to aldehydes, particularly formaldehyde, giving grey precipitates of metallic mercury. The limit is about 0·00005 Gm. of formic aldehyde in 10 c.c. of water, and the precipitate then appears in from one to two minutes. The reagent gives a white precipitate with small quantities of ammonium salts, but these can scarcely be mistaken for the grey precipitate of metallic mercury.

Alkaloidal Determinations by Means of Potassium Bismuth Iodide. D. Jonescu. (*Berichte Pharm*, **1906,** 130; *Journ. Pharm. Chim.* [6], **24,** 279.) Thoms (*Year-Book*, **1905,** 18) and later Jahns have previously shown that alkaloids are completely precipitated and may be determined with considerable accuracy by means of Dragendorff's reagent. The author has experimented with alkaloids not previously employed in this manner, quinine, caffeine, and antipyrine. The base was dissolved in water acidified with sulphuric acid, then precipitated with the reagent; the precipitate was collected, washed with 5 per cent. H_2SO_4, treated in a separator with a mixture of Na_2CO_3 and NaOH, 10 per cent. The orange-red precipitate is gradually decomposed, and the liberated alkaloid is shaken out with ether or with chloroform. In the case of quinine 94 05 per cent. of the alkaloid used was recovered. With antipyrine the yield was less satisfactory, 92·73 per cent. of the amount taken. Chloroform was used for shaking out caffeine and antipyrine; ether for the quinine.

Alkaloidal Determinations, Gravimetric, by Means of Picrolonic Acid. H. Matthes and O. Rammstedt. (*Archiv. der Pharm.*, **245,** 112.) Dinitrophenyl-methylparazolone, or

picrolonic acid, in the form of a N/10 solution, is recommended as an alkaloidal precipitant for strychnine and brucine, hydrastine and pilocarpine.

Valuation of Nux Vomica Extract. One Gm. of the extract is dissolved in 5 Gm. of absolute alcohol and 5 Gm. of water; the solution is well shaken up with ether 50 Gm., and chloroform 20 Gm., then treated with 10 c.c. of a 1 : 2 solution of NaOH and shaken for 10 minutes. The mixture is set aside to separate for 20 minutes. Fifty Gm. of the ether chloroform solution (=0·666 Gm. of the original extract) is then filtered through a double filter, evaporated to one-half, and while still warm treated with 5 c.c. of N/10 picrolonic acid solution. The mixture is set aside for 24 hours, the crystalline brucine-strychnine picrolonate is then collected on a tared Gooch crucible, washed with 2 c.c. of a mixture of alcohol 1 c.c., ether 3 c.c.; drained, dried at 110°C. for 30 minutes, then weighed. Since the molecular weight of brucine-strychnine picrolonate is 628·32, the weight obtained ×0·5798 will give the equivalent of those bases present.

Tincture of Nux Vomica. An approximate and rapid determination of the amount of alkaloids may be made by direct precipitation. Twenty-five Gm. of tincture is diluted with 25 c.c. of water, treated with 5 c.c. of N/10 picrolonic acid solution, and evaporated to one-half on the water-bath. After standing for 24 hours, the alkaloidal picrolonates are collected and treated as described under extract of nux vomica. More accurate results are obtained by first liberating the alkaloids thus. Fifty Gms. of the tincture is evaporated to 10 Gm., then mixed with 5 Gm. of absolute alcohol, 50 Gm. of ether, and 20 Gm. of chloroform; 10 c.c. of NaOH solution (1 : 2) is then added and the whole is well shaken for 10 minutes. The process is then continued as described under the extract, the 50 Gm. of ether-chloroform filtered off (= 33·33 Gm. of the original tincture).

Nux Vomica Seeds. Fifteen Gm. of the powdered drug dried at 100°C. is mixed with 100 Gm. of ether and 50 Gm. of chloroform and well shaken; 10 c.c. of a mixture of 2 parts of NaOH solution 15 per cent. and 1 part of water, is added, the whole being thoroughly shaken for 10 minutes. Then 15 c.c. or q.s. water is added to cause the drug to aggregate when shaken, leaving the ether chloroform mixture clear; after standing for 20–30 minutes 50 Gm. of this is filtered off (=5 Gm. of the original drug) and treated as described under the extract.

Liquid Extract of Hydrastis. Fifteen Gm. of the fluid extract

is evaporated to 5 Gm., the residue is treated with 10 c.c. of water, 10 Gm. of petroleum ether, 50 Gm. of ether and 5 Gm. of AmOH solution. The whole is strongly shaken for 10 minutes, then allowed to stand for 20 minutes, when 40 Gm. (=10 Gm. of the fluid extract) is filtered off, evaporated to one-half and treated with 10 c.c. of N/10 picrolonic acid solution. The process is then completed as described under extract of nux vomica. The molecular weight of hydrastine picrolonate is 647. Of 18 samples examined the lowest figure for hydrastine contained was 2·0564 per cent., the highest 2·3625 per cent.

Tincture of Hydrastis. Fifty Gm. of tincture is evaporated to 10 Gm.; to this water 5 Gm., petroleum ether 10 Gm., and ether 50 Gm. are added, and the whole is well shaken together; then solution of ammonia is added and shaking repeated for 10 minutes. After standing 20 minutes 40 Gm. of the ethereal solution (=33·3 Gm. of the original tincture) is filtered off, evaporated to one-half, treated with 5 c.c. of N/10 picrolonic acid solution, and the process continued as described under fluid extract of hydrastis. Six specimens of tincture examined gave from 0·1671 to 0·1734 per cent. of hydrastine.

Hydrastis Rhizome. Six Gm. of powdered hydrastis rhizome is well shaken up with ether 50 Gm., petroleum ether 10 Gm. and solution of ammonia 6 Gm.; then macerated, with frequent shaking, for half an hour; water 6 Gm. is then added and the whole shaken up until the drug aggregates, leaving the supernatant liquid clear. Fifty Gm. of this (=5 Gm. of original drug) is quickly filtered off, and the process continued as described under the fluid extract, using 5 c.c. of the picrolonate reagent to precipitate the hydrastine. Ten samples of the drug examined gave from 2·378 to 2·424 per cent. of hydrastine.

Jaborandi Leaves. The pilocarpine in jaborandi is thus determined. Fifteen Gm. of moderately finely powdered leaves are macerated with 150 Gm. of chloroform and 15 Gm. of solution of ammonia with frequent agitation. The whole is then thrown on a large covered filter, and as soon as the $CHCl_3$ filters slowly a little water is poured on to force it through. When rather more than 100 Gm. of $CHCl_3$ filtrate has been obtained it is well shaken up with about 1 c.c. of water and set aside for a while, when it settles bright. Exactly 100 Gm. (=10 Gm. of drug) is then weighed off and evaporated to about 10 c.c.; this is treated with 3 c.c. of N/10 picrolonic acid solution and the precipitated pilocarpine picrolonate is treated as

above. It melts with decomposition at 200–205°C. and has the molecular weight 472. Six samples of leaves examined gave by this method from 0·2688 to 0·2931 per cent. of pilocarpine.

Alkaloids, and other Organic Bodies, Behaviour of, towards Solvents, especially Chloroform, in the Perforation Method of Extraction. A. Simmer. (*Archiv. Pharm.*, **244,** 672.)

Neutral solutions of alkaloidal salts have a marked tendency to part with the free base; as might be expected, this tendency to dissociate is less marked with strong bases combined with strong acids; for instance, the neutral salts of nicotine and of atropine yield practically no free base to the continued action of chloroform. But as the basicity of the alkaloids decreases, so a greater quantity of base is extracted by the solvent; thus an appreciable amount is obtained with veratrine, strychnine, brucine, codeine, cocaine and morphine, although $CHCl_3$ is a bad solvent for the last-named. Alkaloids which are only feebly basic, like narcotine, give up much more to the solvent. Many neutral solutions, specially those of hydracid salts and nitrates, part with the base in the free state, or else the salt itself is removed.

Acid solutions of alkaloidal salts, however, yield much less of the base to the solvent, but if the salt of the alkaloid is soluble in $CHCl_3$, then more goes into solution than in the case of a neutral solution.

Feeble bases, such as colchicine, caffeine, narcotine, papaverine and antipyrine pass into solution in the presence of free acid almost as freely as from acid solution as when the base is free. This is notably the case with colchicine and caffeine; with narcotine, papaverine and antipyrine strong mineral acids such as H_2SO_4 or HCl retain the base somewhat, but $H_2C_4H_4O_6$ or $H_3C_6H_5O_7$ are practically inert.

Among the neutral bodies which form compounds with alkalies, salicylic acid, santonin and coussin are markedly dissolved out of alkaline solution by $CHCl_3$; but cantharidin, under like conditions, gives scarcely anything to that solvent. Benzol behaves like chloroform, but it is a less active solvent, and especially so for alkaloidal salts, as such. Ether behaves similarly. CCl_4 is a less active solvent than $CHCl_3$. Amyl and isobutyl alcohols remove morphine from its salts, especially the acetate. Simultaneously it is noted that $CHCl_3$ is slightly decomposed by alkaloids, but the amount of action is so minute

that it is negligible for all ordinary purposes. Brucine is most energetic in this respect.

Aloes, Jafferabad and Uganda, Barbaloin in. E. Léger. (*Journ. Pharm. Chim.* [6], **25,** 476.) *Jafferabad aloes,* authentic samples of which were furnished to the author by W. A. H. Naylor and H. G. Greenish, are proved to contain barbaloin, and not a special aloin, jafaloin, as stated by Tschirch and Hoffbauer. (*Archiv. Pharm.*, **243,** 399.)

Uganda Aloes is also found to contain barbaloin. By comparison with specimens in the Society's museum the author has been able to identify the specimen which was forwarded to him in 1902 as true Barbadoes aloes as being Uganda aloes in chips. (See also *Year-Books,* **1898,** 179; **1899,** 161; **1901,** 27; **1902,** 160; **1903,** 31.)

Aloin, Determination of, in Aloes. F. R. Eldred and C. A. Jennings. (*Proc. Amer. Pharm. Assoc.*, **1906,** 423.) One Gm. of the powdered sample is extracted with a boiling mixture of chloroform and methyl alcohol in an extractor. The solution is filtered, evaporated to dryness, and the residue dissolved in water; the aqueous solution is filtered and shaken out several times with petroleum ether. The bulked petroleum ether washings are then shaken out with alcohol 50 per cent. The alcoholic liquid is evaporated to dryness, redissolved in water, and added to the first obtained aqueous solution; this is extracted with acetic ether in a Bosman's extractor. The acetic ether extract is evaporated, alcohol being added when it is reduced to a small volume; evaporation is continued to dryness; the residue is dried at 110°C. and weighed as crude aloin. The method is not regarded as accurate, but it furnishes useful comparative data.

Alpha-Naphthyl Isocyanate as a Reagent for Alcohols. (*Schimmels' Report, October,* **1906,** 40.) Alpha-naphthyl isocyanate has been found to give a solid crystalline urethanes with certain alcohols which only form liquid compounds with phenyl isocyanate. It is therefore available for the characterization of such alcohols. Unfortunately the naphthyl urethanes obtained appear to be very difficult to completely burn in the course of elementary analysis, so that the carbon values they yield are low, about 3 per cent. *Dihydro-cuminol,* from cummin oil, which

does not form a crystalline compound with phenyl isocyanate, gives two naphthyl urethanes with α-naphthyl isocyanate, one much more soluble than the other in methyl alcohol: the less soluble body occurs in prisms m.p. 146–147°C., the more soluble compound melts below 100°, and is possibly geranyl naphthyl urethane. *Geranyl naphthyl urethane* is obtained with equimolecular quantities of geraniol and α-naphthol isocyanate. Reaction proceeds fairly quickly, and a completely solid mass is formed in 12 hours. Recrystallized from methyl alcohol it forms long needles, m.p. 47–48°C. Terpinyl naphthyl urethane, from terpineol m.p. 35° C., is obtained from the oily reaction-mixture after 6 days' contact, by distilling of the oil in steam and purifying the residue with petroleum ether. The urethane crystallizes from dilute alcohol in feathery prisms, m.p. 147–148°C. The naphthyl urethane from terpineol, m.p. 32°C., has a much lower m.p., 83–84°C. *Linalyl naphthyl urethane* requires heat for its production after the two constituents have been in contact for 5 or 6 days, and then only a small yield is obtained. It crystallizes from dilute methyl alcohol in needles, m.p. 53°C. *Nerol* and *citronellol* do not furnish crystalline compounds with α-naphthyl isocyanate.

Alum, and other Aluminium Salts, Action of, on the Solidifying Point of Gelatin. A. and L. Lumière and —Seyewetz. (*Bull Soc. Chim.* **35**, 676) Alum, and other salts of aluminium, raise the solidifying point of gelatin solutions; this action is due entirely to the amount of aluminium present, and the rise of the solidifying temperature is directly proportional to the amount of the metal; up to a certain percentage, anhydrous aluminium chloride produces the maximum effect, and alum the minimum. The maximum is shown by gelatin containing the equivalent of 0 64 per cent. of alumina; if more of the aluminium salt be present, the solidifying point is lowered. Gelatin, which has fixed this maximum amount of alumina, has the aspect of ordinary gelatin, but it swells more slowly in cold water. Dilute acids have no action on aluminized gelatin at ordinary temperatures, stronger acids, alkalies and alkali carbonates, decompose it. The gelatin appears to fix the aluminium as salts; when the aluminized product is washed with water, these salts are dissociated and a portion of the metal is retained by the gelatin as alumina. The rise in temperature of the solidifying point is 1°C. for each 0·107 per cent. of Al_2O_3 up to 0 64 per cent.

Alypine, Distinctive Reactions of. P. Lémaire. (*Répertoire* [3], **18,** 385.) A 4 per cent. solution of alypine is optically inactive, whereas cocaine hydrochloride solution is active. Stovaine hydrochloride solution is also inactive. If 1 or 2 drops of cobalt nitrate and a few particles of alypine are warmed together in a porcelain capsule the crystals are coloured a fine blue. Cocaine hydrochloride gives a similar reaction. Five Cgm. of alypine dissolved in 20 drops of distilled water gives an almost immediate crystalline precipitate with 9 c.c. of cold solution of zinc chloride, 10 Gm. in 90 c.c. Other anaesthetics under these conditions behave differently. Holocaine hydrochloride gives an immediate white precipitate which soon aggregates in drops on the side of the test-tube; with cocaine and β-eucaine hydrochlorides, and with stovaine, the liquid remains clear; with subcutine a precipitate of acicular crystals is slowly formed in small quantity. If a few particles of alypine are added to 1 c.c. of sodium hypobromite solution a white precipitate is at first formed, then oily drops; even on warming no reddish-brown colour is developed, such as is given with subcutine, nervanine, holocaine hydrochloride, or orthoform. If 2 or 3 drops of 2 per cent. iron alum solution are added to 2 or 3 c.c. of 1 per cent. alypine solution no violet colour like that given by subcutine and nervanine is produced, nor the reddish-brown colour of orthoform. Two or 3 c.c. of 1 per cent. solution of alypine when boiled with 1 c.c. of sulphuric acid gives off the odour of benzoic acid. Alypine, when mixed with calomel and moistened with alcohol, gives a black colour. Alypine is precipitated by several alkali salts and by sodium carbonates, arrhenal, potassium permanganate and chromate, and by borax, so it should not be prescribed with these. The borax precipitate is soluble in excess of that salt.

Amaracus dictamnus, Essential Oil of. (*Schimmels' Report, October*, **1906,** 84.) The oil distilled in Algeria was yellowish in colour and had a strong odour of pulegone; sp. gr. 0·9331 at 15°C.; α_D +3° solubility in alcohol 70 per cent., 1 : 2·7, with slight turbidity in alcohol 80 per cent. 2 : 3, but cloudy when the ratio reaches 1 : 14. It contained 85 per cent. of pulegone.

Ammonia and Nitrogen, New Method for Determining. A. Ronchèse. (*Journ. Pharm. Chim.* [6], **25,** 611.) *Neutral Ammonium Salts.* The neutral solution is diluted to 100 c.c.

with distilled water free from CO_2, a few drops of phenolphthalein indicator are added, followed by a large excess of neutral formalin solution 20 per cent. The mixture is then titrated in the usual manner with N/10 sodium hydroxide solution, each c.c. of which $= 0.0017$ Gm. of NH_3. Phenolphthalein is the only satisfactory indicator. When free acid is present, this must first be neutralized before adding the formalin; but since ammonium salts retard the appearance of the end reaction, a very slight excess of soda will be requisite. If the amount of ammonia present does not exceed the equivalent of 10 c.c. N/10 ammonia solution, the error thus occasioned is about 1/10 c.c. for each 3 c.c. N/10 ammonia present, and this correction should be made. Where a strong acid is present, exact determination can be made thus. The diluted original solution is halved. One part is treated as above without previous neutralization; in the other the total acidity is determined with an indicator not influenced by ammonia, such as litmus, resolic acid, or fluorescein. The difference in the two readings gives the requisite figures.

Nitrogen is converted into ammonium sulphate by Kjeldahl's method. The acid is first partially neutralized by 50 per cent. sodium hydroxide solution, finally with very dilute alkali solution; the neutral solution is treated as above.

Determination of Urea in Urine. The pre-formed ammonia is first determined by diluting 10 c.c. of the urine to 100 c.c., adding phenolphthalein indicator, neutralizing with N/10 NaOH solution and proceeding as described for the method in the presence of free acid, with the same correction. The urea in another portion of the urine is converted into ammonia by boiling with crystalline $MgCl_2$ in presence of HCl, and the total NH_3 determined by distillation. From the figures obtained, the preformed NH_3 is deducted, the remaining NH_3 being the equivalent of urea.

Angelica, Essential Oil of, Thuringian. (*Schimmels' Report, October*, **1906,** 10.) Oil of Thuringian angelica has a lower sp. gr. and a higher rotation than the same oil distilled at Miltitz. The Thuringian oil has the sp. gr. as low as 0·854 at 15°C. and up to $a_D + 36° 10'$; the Saxon distilled oil had the sp. gr. 0·659 to 0·8736 and the $a_D + 24° 2$ to $+ 32° 35'$.

Amygdalin, Hydrolysis of, by Acids. R. J. Caldwell and S. L. Courtauld. (*Proc. Chem. Soc.*, **23,** 71.) Although

amygdalin is ultimately resolved by acids into HCN, C_7H_5OH, and 2 mols. $C_6H_{12}O_6$, the separation of the glucose is effected in two stages. The hydrolysis of the biose section of the molecule proceeds only at about one-sixth the rate at which maltose is hydrolized. By hydrolizing amygdalin with N/HCl at 60°C. Fischer's mandelo nitrile glucoside was obtained.

Arsenates of Lead, Calcium and Sodium. S. Pickering. (*Proc. Chem. Soc.* **23,** 35.) Crystalline sodium arsenate of commerce is the disodium salt generally with 7, but sometimes with 8 mols. H_2O. This water may all be expelled at 100°C., and decomposition into pyro-arsenate commences at 150°C., so the B.P. preparation dried at 300°C. is overheated. With lead acetate all commercially pure samples give a precipitate of triplumbic arsenate; but with lead nitrate the precipitate consists of the diplumbic salt, occasionally mixed with some tri- and mono-plumbic arsenates. With crude sodium arsenates the amount of lead salt required for precipitation varies, and possibly a compound of the di- and tri-plumbic salts may be formed.

With calcium chloride or nitrate, sodium arsenate forms the tricalcium salt, but it is not very insoluble, and therefore unsuitable for use as an insecticide; but it is completely precipitated by calcium hydroxide, so that a mixture of lime and sodium arsenate may be used as an insecticide as a substitute for lead arsenate.

Arsenic, Electrolytic Detection of, in Urine and other Organic Liquids. — Carlson. (*Zeits. Phys. Chem.*; *Nouv. Remèdes*, **23,** 234.) The liquid to be examined is introduced into a U tube, to which Pt. electrodes are fitted. On passing a current of 7 or 8 volts, arsenic and hydrogen are liberated at the cathode, forming AsH_3, which may be detected by means of $AgNO_3$ paper (or $HgCl_2$ paper) placed above the solution. In this manner 0·001 Mgm. of As_2O_3 in 30 c.c. of urine may be detected in an hour. The current should not be allowed to run more than 3 hours, or SH_2 may be generated.

Artemisia absinthium, French and American, Essential Oil of. (*Schimmels' Report, October,* **1906,** 81.) American oil of wormwood contains thujone; thujyl alcohol, free and combined; phellandrene; pinene (?) and cadinene; thujone is the chief

constituent. Roure Bertrand fils find that French wormwood oil differs considerably from this. The oil produced in the Alpes Maritimes district in 1900 from wild plants contained esters 9 per cent.; combined alcohol 7 per cent., free alcohol 71·9 per cent., thujone 8·4 per cent. The same product in 1905 gave esters 5·5 per cent., combined alcohol 4·33 per cent., free alcohol 76·3 per cent., and thujone 3 per cent. These oils therefore contain only a little thujone and a large amount of thujol. Another lot of oil from cultivated plants grown in Grasse gave no less than 35·6 per cent. of esters, with only 12·3 per cent. of free thujol and 7·6 per cent. of thujone.

Artemisia annua and A. variabilis, Essential Oils of. (*Schimmels' Report, April,* **1907,** 13.) *Artemisia annua* gave 0·29 per cent. of oil from the fresh herb cultivated at Miltitz; sp. gr. 0·8912 at 15°C.; $a_D -1° 18'$; acid value, 3·8; ester value, 19·2; acetyl value, 44·5; solubility in alcohol, 80 per cent. 1 : 1 to 2 : 3, with turbidity on adding more due to separation of paraffin.

Artemisia variabilis. Sp. gr., 0·9115; $a_D - 9° 20'$; acid value, 1·7; saponification value, 15·5; acetyl value, 49·1. Not completely soluble in alcohol.

Atomic Weights for 1907. (*Annales de Chim. Analyt.,* **12,** 5.) The International Commission has authorized the following atomic weights for 1907. That of nitrogen is now 14·01 instead of 14·004; bismuth is 208, not 208·5; tantalium 181, instead of 183; terbium 159, instead of 160; europium has been added and dysprosium will be included as soon as its atomic weight is settled. The weight for chlorine is too low, but this depends on that of silver, which has not yet been settled.

Oxygen = 16.

Aluminium	Al	27·1	Chlorine	Cl	35·45
Antimony	Sb	120·2	Chromium	Cr	52·1
Argon	A	39·9	Cobalt	Co	59
Arsenium	As	75	Copper	Cu	63·6
Barium	Ba	137·4	Erbium	Er	166
Beryllium	Be	9·1	Europium	Eu	152
Bismuth	Bi	208	Fluorine	F	19
Boron	B	11	Gadolinium	Gd	156
Bromine	Br	79·96	Gallium	Ga	70
Cadmium	Cd	112·4	Germanium	Ge	72·5
Cæsium	Cs	132·9	Gold	Au	197·2
Calcium	Ca	40·1	Helium	He	4
Carbon	C	12	Hydrogen	H	1·008
Cerium	Ce	140·25	Indium	In	115

Iodine	I	126·97	Ruthenium	Ru	101·7
Iridium	Ir	193	Samarium	Sa	150·3
Iron	Fe	55·9	Scandium	Sc	44·1
Krypton	Kr	81·8	Selenium	Se	79·2
Lanthanium	La	138·9	Silicium	Si	28·4
Lead	Pb	209·9	Silver	Ag	107·93
Lithium	Li	7·03	Sodium	Na	23·05
Magnesium	Mg	24·36	Strontium	Sr	87·6
Manganese	Mn	55	Sulphur	S	32·06
Mercury	Hg	200	Tantalium	Ta	181
Molybdenum	Mo	96	Tellurium	Te	127·6
Neodymium	Nd	143·6	Terbium	Tb	159·2
Neon	Ne	20	Thallium	Tl	204·1
Nitrogen	N	14·01	Thorium	Th	232·5
Nickel	Ni	58·7	Thulium	Tu	171
Niobium	Nb	94	Tin	Sn	119
Osmium	Os	191	Titanium	Ti	48·1
Oxygen	O	16	Tungsten	W	184
Palladium	Pd	106·5	Uranium	U	238·5
Phosphorus	P	31	Vanadium	V	51·2
Platinum	Pt	194·8	Xenon	X	128
Potassium	K	39·15	Ytterbium	Yb	173
Praseodymium	Pr	140·5	Yttrium	Y	89
Radium	Ra	225	Zinc	Zn	65·4
Rhodium	Rh	103	Zirconium	Zr	9 6
Rubidium	Rb	85·5			

Atoxyl, Constitution of. E. Fourneau. (*Journ. Pharm. Chim.* [6], **25,** 332, 528.) Atoxyl has been put on the market as a new compound, the anilide of metarsenic acid, $C_6H_5NHAsO_2$, containing 37·69 per cent. of arsenic. It has not this composition, but is the monosodic salt of the anilide of orthoarsenic acid, $C_6H_5NH-AsO{<}^{ONa}_{OH}+2H_2O$. This body, far from being new, was prepared in 1863 by Béchamp by heating aniline arsenate. The product so obtained is identical in every respect with the "new" atoxyl.

Atoxyl, Detection of. J. Bougault. (*Journ. Pharm. Chim.* [6], **25,** 630.) The reagent employed by the author for the detection of As. in glycerin (sodium hypophosphite 10, water 10; HCl 100, *Year-Book*, **1902,** 36) is equally serviceable for the detection of small quantities of atoxyl, with which it gives a yellow precipitate in the cold, and dark brown when heated. The yellow precipitate appears slowly and is a less sensitive test; but the brown precipitate on warming may be obtained with 0·05 Mgm. of atoxyl; and 10 Mgm. dissolved in 250 c.c. of urine is easily detected by the test.

Bakankosin, a New Glucoside from a Malagasy Strychnos. H. Hérissey and E. Bourquelot. (*Journ. Pharm. Chim.* [6], **25,** 308 ; *Comptes rend.*, **144,** 576.) A new glucoside, bakankosin, occurring in large, bitter, colourless crystals, has been extracted from the seeds of an undetermined species of *Strychnos*, known to the natives of Madagascar as "bakanko." Bakankosin loses 4·8 per cent of water at 115°C. It contains nitrogen. The solution of the hydrated crystals have the α_D −195·4°. The glucoside is soluble in water and in alcohol, and is hydrolized by boiling with dilute mineral acids, and by the action of emulsin, with the formation of dextrose. It appears to be non-toxic, since when administered to guinea-pigs in doses of 0·28 Gm. per kilo it is inert. Its products of hydrolysis are also non-toxic.

To extract it the coarsely powdered seeds were freed from fat by means of ether, then extracted with hot alcohol, 95 per cent. The solvent was distilled off under reduced pressure in the presence of $CaCO_3$. The residue was dissolved in water, then fermented with top-yeast to eliminate the saccharose present. After 24 hours, the liquid was filtered and evaporated, when bakankosin separated out in large coloured crystals from the syrupy liquid. It was purified by treatment with animal charcoal, and recrystallizing from boiling alcohol and boiling water; the yield was 4·88 per cent.

Baptisia tinctoria, Glucosides of. K. Gorter. (*Archiv. Pharm.* **244,** 401.) The author has previously (*Year-Book*, **1898,** 134) isolated and described the three glucosides, baptisin, pseudo-baptisin and baptin. A small quantity of cytisine is also present. The present note deals chiefly with the action of emulsin on pseudo-baptisin, the other matter being a reiteration of the above quoted work. That ferment hydrolyses pseudo-baptisin $C_{27}H_{30}O_{14}$ into γ-baptigenine $C_{15}H_{10}O_5$, and rhamose, in a similar manner to dilute acids as previously described; γ-baptigenine thus formed is insoluble in water; the best solvent is nitrobenzene, from which it crystallizes in small needles, m.p. 298°C. It is very soluble in NaOH solution, from which it is precipitated by CO_2; and on adding NaCl to the alkaline solution a precipitate of NaCl and γ-baptigenin-soda is obtained.

Barbaloin, Distribution, Composition, and Formula of.— E. Léger. (*Journ. Pharm. Chim.* [6], **25,** 513.) The aloins of

all the aloes examined by the author are found to be barbaloin; so the various distinctive prefixes which have been used by previous investigators to indicate what were supposed to be distinct chemical bodies should be abandoned, and the term barbaloin alone retained. The only aloin concerning which there is any doubt is the so-called zanaloin, which Tschirch and Hoffbauer have stated to be sparingly soluble in methyl alcohol, and to have the m.p. 210–212°C.

The author adheres to his formula $C_{21}H_{20}O_9$ for barbaloin, which renders it an isomer of frangulin; that is, a special glucoside, derived from methyl-isoxychrysasin (aloemodin) and a methyladopentose. That barbaloin is dissociated on prolonged keeping in alcoholic solution into methyl-isoxychrysasin and aloinose has actually been proved (*Year-Book*, **1905**, 20). If barbaloin had the formula proposed by Tilden it could not be optically active, and it could not form the body $C_{15}H_6Cl_4O_5$ from chlorobarbaloin with the formula $C_{16}H_{13}Cl_3O_7$. Further, the analytical figures obtained by Shenstone for Jafferabad aloin and by Tschirch and Hoffbauer for Barbados, Curaçao and Jafferabad aloin all agree better with the formula $C_{21}H_{20}O_9$, than with the formula the authors have adopted for these "aloins." The formula is also confirmed by cryoscopic results with acetyl-chlorobarbaloin.

Belladonna, Alkaloidal Assay of Liquid Extract of. M. J. Perry. (*Chem. and Drugg.*, **69**, 807.) The official method of estimating the alkaloidal content of *Extractum Belladonnae Liquidum* has been the subject of much comment and criticism. In regard to time, it leaves much to be desired. The following method is quicker and simpler.

To 15 c.c. of liquid extract of belladonna add 3 c.c. of dilute HCl and make up to 75 c.c. with water; shake well and filter off 50 c.c. The filtrate will generally be very much clearer if the mixture be allowed to stand for 15 minutes before filtering. Place 50 c.c. of Wagner's reagent in a suitable beaker and add the filtrate slowly, with constant stirring, and set aside for a few moments to allow complete precipitation. Collect the precipitate on a filter-paper having a diameter of about 1 decimetre, washing on to the filter with water containing a little Wagner's reagent and allow to drain well.

Attach a small piece of rubber tubing to the neck of the funnel and close the end with a clip. Warm 30 c.c. of sulphurous

acid, B.P., to about 60°C., pour on the filter-paper, and allow to remain till cold or until the precipitate is dissolved. Remove the clip and collect the filtrate, returning it once or twice to the filter. Wash the filter with a warm mixture of 1 c.c. of sulphurous acid and 9 c.c. of water, and continue till the washings give no reaction with Wagner's reagent in excess.

Place the filtrate and washings (which may be evaporated to smaller volume if too bulky) in a separator; make alkaline with AmOH, extract with $CHCl_3$, evaporate at a low temperature, and titrate as in the B.P. process.

In assaying the tincture, the alcohol must first be evaporated off. If care be taken to leave no alkaloid in the filter-paper, this process gives the same results as the B.P. method.

Belladonna Root, Varying Alkaloidal Value of. (*Evans' Analytical Notes*, **1907,** 8.) The alkaloidal content of belladonna fluctuates enormously, recent examinations giving results ranging from practically nil to 0·4 or 0·5 per cent. Of 51 specimens examined, 4 contained less than 0·1 per cent., 8 gave between 0·1 and 0·2 per cent., 17 between 0·2 and 0·3 per cent., 9 between 0·3 and 0·4 per cent., and 13 from 0·4 to 0·5 per cent. Appearance is no guide to quality.

Benzoates of Strontium, Potassium, Lead and Zinc, Solubility of. R. Paretta. (*Boll. Chim. Farm.* through *Annales de Chim. Analyt.*, **12,** 32.) *Strontium benzoate*, which has not been previously described, is a white, heavy, crystalline powder. It contains 1 mol. H_2O, which is slowly given up at 130–140°C., but not at 110–120°C. 100 Gm. of the saturated solution contains 5 Gm. of the anhydrous salt at 15·7°C.; 5·40 Gm. at 24·7°C.; 5·56 Gm. at 31·4°C., and 5·77 Gm. at 40·9°C. *Potassium benzoate* contains in 100 Gm. of saturated solution 41·1 Gm. at 17·5°C.; 42·4 Gm. at 25°C.; 44·0 Gm. at 33·3°C.; 46·6 Gm. at 50°C. *Lead benzoate* solution, when saturated, contains in 100 Gm. 0·189 Gm. at 18·0; 0·249 Gm. at 40·6; 0·310 Gm. at 49·5°C.

Benzoic Acid, Distinction of Synthetic from Natural. H. Cormimbœuf and L. Grosman. (*Répertoire* [3], **19,** 9.) Five Gm. of the acid is intimately mixed with 5 Gm. of pure Na_2CO_3 free from Cl. The organic matter is burnt off, and the residue taken up with hot distilled water. After filtration the liquid is acidified with HNO_3 and tested for Cl with $AgNO_3$

reagent. Any visible reaction indicates the presence of synthetic acid, which invariably contains traces of Cl as an impurity.

Benzoic Acid, Differentiation of Natural from Synthetic. E. L. Belloni. (*Répertoire* [3], **19,** 57.) The author controverts the above statement of Corminbœuf and Grosman that the presence of Cl in benzoic acid is invariably an indication of synthetic origin. An authentic specimen of the acid from Siam benzoin has been found to contain more Cl than a certain synthetic acid examined.

Benzoin, Siam and Sumatra. (*Southall's Report*, **1907,** 7.) *Sumatra* benzoin, examined during the past year, has given the following figures as a mean of 25 samples examined:—Solubility in alcohol 90 per cent., 69·2; lowest 58·3, highest 77·5; free balsamic acids calculated as $HC_7H_5O_2$, 8·77; lowest 5·31, highest 11·55. Combined balsamic acids, as above, 11·26; lowest 8·9, highest 12·35.

Siam benzoin; one sample examined, gave:—Solubility in alcohol 90 per cent., 93·3; free balsamic acids as above, 2·59; combined balsamic acids, 32·2.

Benzoins of Commerce. E. M. Holmes and E. W. Bell. (*Pharm. Journ.* [4], **24,** 127.) From the results of the examination of a large number of commercial samples it appears that first-class Sumatra benzoin may contain as little as 4·50 per cent. of impurity, insoluble in 90 per cent. alcohol, that ordinary commercial or seconds gives from 8 to 10 per cent., and that inferior qualities may yield 20 to 23 per cent.; that Penang or storax benzoin may contain from 4·73 to 11·60 per cent.; Saigon, 5·30 to 10·80; Palembang, first quality, from 3·32 to 7·20 per cent.; second quality, 5·45; and third quality, 29·98 per cent.; Siam, first quality, 0·66 to 2·63 per cent.; seconds, 1·32 to 10·50 per cent.; thirds, from 8 0 to 13·08 per cent.; and siftings, from 3·92 to 11·33 per cent. Presuming, therefore, that in medicine only the finest quality should be used, the following data may be taken for a B.P. standard:—Siam, not more than 3 per cent.; Sumatra, not more than 10 per cent.; Palembang, not more than 8 per cent.; storax benzoin and Saigon benzoin, not more than 6 per cent. With regard to the percentage of benzoic acid, Hanbury states in *Pharmacographia* that 8½ to 13 per cent. was found in benzoin, but Bell finds from 20 to 26 per

cent. of total acids in the storax benzoin, and 27 to 29 per cent. in the Saigon variety; in Sumatra, 19 to 28 per cent.; in Palembang 25 to 27 per cent., and in Siam, 30 to 37 per cent. From the point of view of benzoic acid percentage, therefore, as well as from small percentage of ash, the Siam variety is evidently the most suitable for use in medicine. Its agreeable vanilla flavour is also a recommendation. With respect to cinnamic acid it is reported in *Pharmacographia* that Kolbe and Lautemann found it in Siam and Penang benzoin, but Bell has found it in Sumatra and Penang benzoin only.

Beta-Naphthol-Carbonic Acid as a Preservative. F. Anto. (*Pharm. Journ. Jap.; Pharm Centralh.*, **48,** 318.) This compound has been found to act as an effective preservative of saki, the Japanese popular beverage; it is suggested that its employment as a preserving agent for dietetic articles should receive official sanction.

Beta-Sulphopyrine Not a Chemical Compound. F. Zernik. (*Apoth. Zeit.*, 1907, **22,** 78.) It is found that certain forms of β-sulphopyrine, claimed to be a definite compound, antipyrine sulphanilate, have not this composition, but are simply mixtures containing, approximately, 10 parts of sodium sulphanilate, 9 parts of antipyrine, and 1 part of sulphanilic acid.

Bismuth Iodide. L. Berkenbach. (*Berichte*, **40,** 1404.) BiI_3 cannot be obtained pure by the direct combination of the elements since it always then contains uncombined Bi. Nor can it be prepared by the wet process; for then oxyiodide is a contamination. It may be obtained pure by treating a saturated solution of iodine in Bettendorf's reagent with a solution of Bi_2O_3 in HCl. It separates as small blackish grey metallic crystals.

Blood, Detection of Traces of, in Faeces. Cettinger and — Gibault. (*Nouveaux Remèdes*, **22,** 537, after *S. Pharm. Chim.*) Rub down with a little water, add one-third its volume of acetic acid, then add 8 to 10 c.c. of ether, mixing cautiously to avoid forming an emulsion. Decant the ether into a test tube and add to it 15 or 20 drops of fresh tincture of guaiacum in absolute alcohol and 30 or 40 drops of hydrogen peroxide or of old oil of turpentine. If the liquid is cloudy, it is

cleared by the addition of a little absolute alcohol. In a few minutes the liquid assumes a violet blue colour if blood be present; if there are only traces, the tint is greenish. If solution of aloin in alcohol 60 per cent. is used instead of guaiacum tincture, the colour formed is cherry-red.

A more delicate reagent is a saturated solution of benzidine in hot alcohol 90 per cent. A small quantity of the faecal matter is suspended in enough water to make a thick liquid, of which 4 or 5 c.c. are treated in a test-tube with 1 c.c. of glacial acetic acid; after mixing 2 c.c. of the freshly prepared benzidine solution is added, and 2 c.c. of hydrogen peroxide. In the presence of the least trace of blood a deep green colour is produced, with a bluish shade if there is a notable amount of blood. In a few minutes this becomes blue, ultimately changing to dull brown.

Blood, Detection of, in Water, Urine, and Faeces. O. and R. Adler. (*Merck's Jahresberichte*, **20**, 61.) Para-diamido diphenol, or benzidine in saturated alcoholic solution is used as a reagent for blood. In the case of urine, from 10 to 15 c.c. is treated with half its volume of glacial acetic acid and shaken out with ether. The latter is separated and treated with a little H_2O_2 solution, a few drops of glacial acetic acid and 1 c.c. of the benzidine solution. A green colour indicates the presence of blood. Aqueous solution of blood is treated direct with a few drops of H_2O_2 and $HC_2H_3O_2$ and 1 c.c. of the reagent. The same applies to aqueous solution of faecal matter. O. Schumm and C. Westphal find that the reaction is more sensitive by adding 2 c.c. of the benzidine solution to the liquid to be tested, then a few drops of acetic acid and lastly 2 c.c. of H_2O_2; the latter should not be stronger than 3 per cent. The reaction will detect blood in a dilution of 1 : 200,000 whereas the guaiacum test is only sensitive to 1 : 23,000. Iron salts and some animal and vegetable oxydase ferments may give rise to a green colour. Schlesinger and Holt further modify the test for clinical use by employing a saturated solution of benzidine in glacial acetic acid; 10 or 12 drops of this are mixed with 2 or 3 c.c. H_2O_2 and 1 to 3 drops of the aqueous suspension of the faeces added, and heated to boiling, when a green, bluish green or blue colour indicates blood.

Brucine Oxide. A. Pictet and G. Jenny. (*Berichte*, **40**, 375.) When brucine is dissolved with gentle heat in 3 per

cent. H_2O_2 solution, on cooling fine colourless crystals of brucine oxide $C_{23}H_{26}H_2O_5+4\frac{1}{2}H_2O$ separate out; when hydrated these melt at 124–125°C., when anhydrous, at 199°C. with decomposition. Brucine oxide is a monivalent base. The nitrate, $C_{23}H_{26}N_2O_5 . HNO_3+H_2O$ separates in large colourless prisms, when the alcoholic solution of the oxide is treated with a little nitric acid.

Cacao and Tea, Carbohydrates of. (*Bull. gen. de Therap.*, **153,** 153, after *Zeits. Zuckerindust.*) Cacao beans yield arabinose, galactose and dextrose. The dried leaves of tea give 5·6 per cent. of a pentosan and on hydrolysis yield arabinose, glucose and galactose. Cacao butter contains a Phytosterin.

Cade Oil, Genuine, Method of Production and Characteristic Reaction of. C. Pepin. (*Journ. Pharm. Chim.* [6], **24,** 49, 248.) After considerable difficulty the geographical source of cade oil was traced to the departments Var, Gard and Alpes Maritimes in Southern France, where the author proceeded and was actually present during the process of distilling the oil. The wood employed is derived solely from *Juniperus oxycedrus*, which is readily distinguished from allied species by its fruit, which is nut-like and green to orange when ripe. It is not cultivated since in suitable districts it grows wild in great profusion. The wood is cut into logs which are sorted out, the "fat" logs being used for distillation and the poor as fuel for the process. The heart wood furnishes the moist oil. The logs are then cut into billets which are packed in the "still." This consists of a large iron pot which, packed with the billets, is turned down and luted on to a flat hollowed out hearth stone. The latter has a hole at the bottom of the cavity. The worthless wood is heaped around the pot and lighted. A crude destructive distillation *per descensum* thus takes place. When working on a larger scale a trench is fitted at the bottom with a hearth to which a discharge tube is attached; a heap of billets is placed in the centre and built round with luted bricks; the trench is then filled with wood and fired. Distillation then proceeds as with the smaller arrangement. Care is exercised that too quick a fire is not employed, otherwise more tar and less oil of a darker colour is produced. As distillation proceeds the product is caught in pots, bulked, and set aside for at least 15 or 20 days. It then separates into three layers. At the

bottom there is a tarry mass, then an aqueous layer, and finally the cade oil on top. This oily layer, lighter than water, is formed of a fluid clear oil with a reddish brown colour by transmitted light and a characteristic smoky odour. The following reaction is distinctive of genuine cade oil. One c.c. is shaken up with 15 c.c. of petroleum ether and filtered. Ten c.c. of the filtrate is shaken up with an equal volume of 5 per cent. aqueous solution of neutral copper acetate. After separation, 5 c.c. of the supernatant petroleum ether layer is decanted, mixed with 10 c.c. of ordinary ether and filtered; the filtrate should be of a light yellowish brown tint. If pine tar oil has been added the colour will be bright emerald green. This test is virtually that of Hirschsohn, with the exception that that investigator regarded the production of the green colour as being characteristic of true cade oil, whereas, it is, on the contrary, an indication of adulteration. By this test the presence of 10 per cent. of pine tar oil is easily detected. A specimen of cade oil has been met with which differed from the authentic oil in not responding to the above test and in having a less pronounced odour. There being no question of fraud in this case, inquiry led to the discovery that the product was not obtained from *Juniperus oxycedrus* alone, but from the wood of three species of *Juniperus*. The characters of genuine cade oil are thus summarized. It should be fluid, have a distinct smoky odour, and should be lighter than water. Its free acid should not exceed the equivalent of 1·5 parts of acetic acids in 100 parts by volume of the oil. The colour reaction of the petroleum ether extract with cupric acetate, obtained as described above, should be brown. Under ordinary pressure, at least 65 per cent. of the oil distils between 150 and 300°C.; and not less than 70 to 75 per cent. passes over, under 65 Mm. between 10° and 215°C. The furfural test is found to be valueless for distinguishing pure from adulterated samples.

Caffeine, Determination of, in Unroasted Coffee. C. Wolff. (*Zeit. oeff. Chem.*, **12,** 186.) (*Journ. Pharm. Chim.* [6], **24,** 12-5.) The ground beans are extracted with $CHCl_3$ in a Soxhlet apparatus for 9 hours. The solvent is then distilled off and the N determined in the residue. From this the amount of caffeine is calculated. $CHCl_3$ dissolves no nitrogenous substance besides caffeine from raw coffee beans, but the method is not applicable to roasted coffee.

Calamintha nepeta, Essential Oil of. (*Schimmels' Report*, October, **1906**, 14.) The oil distilled from the herb is known on the French market as "essence de marjolaine." The sample examined was greenish yellow in colour, with a mint-like odour; sp. gr. 0·9271; $\alpha_D + 6°49'$, ester value 13·0; soluble in alcohol 70 per cent. 1 : 2·7 and more. On fractionating the oil *in vacuo* the new ketone found by Genvresse and Chablay (*Year-Book*, **1903**, 46) was sought in the portion boiling at 208–209°C. at 5 mm. pressure. Pulegone together with another ketone body which would not combine with either neutral or acid sulphite were detected. After removing all the pulegone with sodium sulphite the residue was identified as lævo-menthone. It is probable that the calamenthone of Genvresse and Chablay is a mixture of pulegone and menthone.

Calamus Root, Japanese, Essential Oil of. V. Asakina. *Apoth. Zeit.*, **21**, 987.) The sweet flag of Japan appears to be identical with *Acorus calamus*. Its roots yield 3 per cent. of essential oil which is yellow in colour, bitter, and has a peculiar odour. Sp. gr. 0·976 at 15°C.; α_D from $+25$ to $+28°$ at 21°C.; η_D 1·513 at 15°C.; ester value 0; acetyl value, 17; it distils between 250–280°C. It contains methyleugenol and probably sesquiterpenes.

Calcium Phosphate, Impure. (*Evans' Analyt. Notes*, **1907**, 11.) Ultramarine, sodium carbonate, and copper have been detected as contaminations of specimens of calcium phosphate.

Calumba, Alkaloids of. J. Gadamer. (*Archiv. Pharm.*, **244**, 255 and E. Guenzel, *ibid.*, 257.) Gadamer has already shown (*Year-Book*, **1903**, 47) that calumba root contains two alkaloids, at least, which differ from berberine. Guenzel has succeeded in isolating one, columbamine $C_{21}H_{23}NO_6$. The alcoholic extract of the root was redissolved in alcohol and treated with a small quantity of ether, which precipitated impurities; the alcohol ether solution was decanted and distilled; the residue taken up with water and shaken out with ether which removed columbin and fat. After evaporating the dissolved ether, the aqueous solution was filtered through kieselguhr and the bases precipitated from the filtrate with 25 per cent. KI solution. The air-dried precipitate was extracted with boiling alcohol and the crystalline insoluble residue purified by

recrystallization from alcohol. The acoholic mother liquorscontain the iodide of another base. Columbamine iodide $C_{21}H_{22}NO_5I$ forms orange needles blackening at 180°C., melting at 224°C. Although only slightly soluble in water its aqueous solutions are deep yellow in colour. By treating this salt with moist AgCl the chloride $C_{21}H_{22}NO_5Cl$ was obtained; m.p. 198°C. not very sharply. A number of other salts and derivatives are described. Columbamine appears to have four methoxyl groups, like berberine.

Camphor Cubes, Adulterated. G. Weigel. (*Pharm. Centralh.*, **42,** 865.) Stearic acid has been found as an adulterant in continental specimens of camphor in cubes; about 50 per cent. of this "camphor" was found to be insoluble in cold alcohol; all was dissolved on warming, but a large proportion separated out as the solution cooled. Its acid value was 103 8, equivalent to the above amount of stearin.

Camphor, Synthetic, Tests for. A. Baselli. (*Répertoire*, [3], **19,** 125, after *Giornale Farm. Trieste.*) 1 Gm. of the camphor is intimately mixed with 2 Gm. of Ca2HO free from Cl. The mixture is heated until all the camphor has been volatilized. The residue, when boiled with water, filtered, and the filtrate is rendered acid with HNO_3, should give no precipitate when treated of $AgNO_3$ solution. 5 Gm. of the camphor dissolved in 50 Gm. of alcohol 90 per cent. is treated with 5 Gm. of hydroxylamine hydrochloride and 8 Gm. of NaOH with sufficient alcohol to give a clear mixture. This is then heated [under a reflux condenser] for 90 minutes. The resulting solution should give no turbidity when treated with water, indicating the absence of camphene and of isoborneol. The precipitate obtained on neutralizing the solution with HCl should be soluble in excess of that acid, and in NaOH solution.

Camphor Trees, Cultivation of, in Various Countries, and their Products. (*Schimmels' Report, October*, **1906,** 18.) *Ceylon.*—The production of camphor in the island does not much exceed 1,000 kilos, which for the area under cultivation is not satisfactory. It is believed that this result is due in part to the lack of experience of the planters in distillation.

California.—Kimberlin in the *American Druggist* states that camphor trees occur at Berkeley in California. The leaves of

the trees yielded about 0·15 per cent. of pure camphor on distillation; the camphor from the wood was not so pure. The trees flourish well in California and S. Carolina, where about 6,000 are planted annually under the direction of the Department of Agriculture.

Italy.—Camphor trees thrive almost everywhere in Italy, except near the Alps. It is suggested that its cultivation might be remunerative. The leaves of Italian trees are stated to yield 1 per cent. of camphor.

French Indo-China.—In Tonquin the average yield of camphor with camphor oil from the branches of the tree is 3·9 per cent.; from the lower part of the trunk 2·7 per cent., and from the roots 4·6 per cent.

German East Africa.—A camphor oil obtained by distilling leaves and branches of camphor trees $2\frac{1}{4}$ and $1\frac{1}{2}$ years old in Atamani was sent over for examination. The original oil had separated camphor spontaneously and this had been filtered out. The filtered oil had the sp. gr. 0·9236 at 15°C.; $a_D + 39°20'$; soluble in alcohol 90 per cent. 1 : 0·25 and in alcohol 80 per cent. 1 : 10. The odour differed markedly from that of ordinary camphor oil; it congealed to a solid mass when cooled. It yielded a trace of a phenol to 4 per cent. NaOH solution which had an odour like carvacrol; no eugenol nor safrol was present. It contained 75 per cent. of camphor. Borneol and other alcohols were present only in traces, the acetylation value of the oil being only 14·5.

Cantharides, Assay of. P. A. W. Self and H. G. Greenish. (*Pharm. Journ.* [4], **24,** 324.) After reviewing previously published methods and conducting numerous experiments which are detailed, the following method was adopted for the quantitative extraction of cantharidin.

Take 20 Gm. of cantharides in fine powder and moisten in a mortar with 3 c.c. of strong HCl, pack it in a Soxhlet and attach a 250 c.c. wide-mouth flask as receiver. Then pour on 80 c.c. of benzene, attach a reflux condenser, and extract on a sand bath for two hours, adding a little more benzene during the process, if necessary. Wash the cantharides and the Soxhlet with 25 c.c. of benzene. Distil off the benzene as far as possible on a water-bath, and drive off the last traces by immersing the flask in hot water and blowing in air. Shake the distilled benzene with successive portions of 20 c.c., 20 c.c., and 10 c.c. of

a 1 per cent. solution of KOH to recover traces of cantharidin which distil over; acidify the mixed alkaline shakings with HCl, make up to 105 c.c. with distilled water, and add to the residue of fat and cantharidin in the flask. Then boil the mixture for ten minutes under a reversed condenser, allow the fat to separate, and, while the liquid is still near the boiling point, transfer 100 c.c. of the aqueous layer to a separator capable of holding about 500 c.c. This is best done by means of a 50 c.c. pipette. Repeat the boiling and separation with four more quantities of 50 c.c. of water, each time boiling the mixture for 5 minutes, and frequently well shaking. To the mixed aqueous liquid add 3 c.c. of strong HCl, and shake out with successive portions of 30 c.c., 30 c.c., 20 c.c., and 20 c.c. of $CHCl_3$. Transfer the $CHCl_3$ solutions to a tared flask, distil off the solvent, and drive off the last traces by gently heating. Then wash the residue with three portions of 5 c.c., 5 c.c., and 2 c.c. of a mixture of equal parts of absolute alcohol and petroleum spirit saturated with cantharidin, pouring the washings through a plug of cotton wool in a small funnel. Wash the flask and cotton wool with petroleum spirit until a little of the filtrate on evaporation leaves no appreciable residue. Then pour a little $CHCl_3$ through the cotton wool into the flask, in order to dissolve any crystals of cantharidin retained. Evaporate and dry at a temperature of 60° to 65°C., until of constant weight.

Cantharides were found to yield 0 690 to 0 839 per cent. of cantharidin, and Chinese *Mylabris* 1·215 per cent.

Cantharides, Assay of. — K Siegfried. (*Schweiz. Woch.*, **44**, 342.) Fifteen Gm. of finely powdered cantharides is weighed into a 250 c.c. Erlenmeyer flask, with 150 Gm. of $CHCl_3$ and 1 c.c. of HCl of specific gravity 1·124. Shake for several minutes and then let the mixture stand, with occasional shaking, for 24 hours. Filter 100 Gm. through a covered filter into a 200 c.c. Erlenmeyer flask; distil off the $CHCl_3$ in a water-bath at as low a temperature as possible, and blow on to the residue with some force, from a pipette, 10 c.c. of petroleum spirit; rotate and filter through a small filter. Bring the remainder of the crystals on to the filter by rinsing with petroleum spirit. Dry at 50°C. and weigh.

Carnauba Wax. (*Southall's Report*, **1907**, 8.) Eight samples examined gave the following characters :—M.p., 82·5° to 84°C. ;

sp. gr., 0·995 to 1·002; saponification value, 73·4 to 81·1. An adulterated product, containing paraffin, had the following characters :—Sp. gr., 0·837 ; m.p., 71° ; saponification value, 9·7. This was offered as "bleached" carnauba wax.

Carpinus betulus, Tannin of the Leaves of. K. Alpers. (*Archiv. der Pharm.*, **244,** 575.) The leaves of the hornbean, *Carpinus betulus*, contain neither glucoside nor alkaloid, but they yield a tannin closely resembling ellago-tannic acid, giving as decomposition products ellagic and gallic acids. The exact constitution of ellagic acid has not yet been definitely fixed, and the form of its crystals varies with the method of preparation. It loses a certain weight at 100°C., but this is not due to loss of water of crystallization, but to the formation of an anhydride.

Castor Oil, Preparation of Esters of the Fatty Acids of. A. Haller. (*Comptes rend.*, **144,** 462.) When castor oil is heated with methyl alcohol containing 1 or 2 per cent. of HCl, the glycerides are saponified and methyl esters of the fatty acids formed, which may then be separated by fractional distillation *in vacuo*. By substituting ethyl, propyl or isobutyl alcohol for methyl alcohol the corresponding stearic, rincinoleic, and dioxystearic esters are readily formed. Ethyl and methyl rincinoleate when distilled under normal pressure, are split up, giving good yields of œnanthylic aldehyde and methyl or ethyl undecylate.

Cerium Salts of Organic Acids. G. T. Morgan and E. Cahen. (*Pharm. Journ.* [4], **24,** 428.) A number of compounds of cerium with certain organic acids are described.

Cetraria islandica and other Lichens, Carbohydrates of. — Ulander and B. Tollens. (*Journ. Pharm. Chim.* [6], **24,** 121 ; *Berichte*, **1906,** 401.) The lichens were first treated with solution of K_2CO_3 and washed with cold water to remove acids. The residue was then digested in boiling water to remove the carbohydrates soluble at that temperature. The residue from this treatment was hydrolized by boiling with 5 to 8 per cent. H_2SO_4 for several hours, filtered, and the filtrate neutralized with $CaCO_3$. Gum and decomposition products were then removed by means of alcohol, and the purified sugars identified in the filtrate. These were found to be glucose, galactose, and mannose.

Cetraria islandica gave lichenin, soluble in boiling water, and precipitated by alcohol; on hydrolysis this furnished dextrose only; when distilled with HCl sp. gr. 1·060 lichenin gave a distillate containing furfural and methyl-furfural equivalent to 2·1 per cent. of pentosanes. The residue insoluble in boiling water when hydrolized with H_2SO_4, yielded chiefly dextrose and but little dextro-mannose or dextro-galactose; it contained about 3·5 per cent. of methyl-pentosanes.

Cladonia rangiferina, reindeer moss, two varieties of which were examined, contained no lichenin. Hydrolysis afforded at least 30 per cent. of mannose, some galactose, and very little dextrose; the pentosanes amounted to 1·7 per cent.

Stereocaulin pascale and *Peltigeria apthosa* gave dextro-mannose and dextro-galactose, but no dextrose; it yielded 2·05 per cent. of pentosanes, but no lichenin.

Evernia prunastri yielded a carbohydrate, everniin, soluble in boiling water, which when hydrolized, afforded dextrose with very little galactose and 3 per cent. of pentosanes; it is strongly dextro-rotatory, thus differing from lichenin, which is optically inactive. The residue insoluble in boiling water gives much dextro-galactose when hydrolized, a little dextro-mannose, and 3·8 per cent. of pentosanes. It contains no arabinose.

Usnea barbata contained a principle analogous to lichenin; the water-insoluble residue when hydrolized gave dextrose, dextro-mannose, dextro-galactose and pentosanes.

Cornicularia aculeata contained lichenin and similar carbohydrates to *Usnea barbata*.

Bulgaria inquians, although not a lichen but a fungus, contains a body similar to lichenin; the insoluble residue, when hydrolized, yielded dextro-mannose, dextro-galactose, and pentosanes.

The lichens examined therefore fall into two groups, those like *Cetraria* containing water-soluble lichenin, or everniin, and leaving an insoluble residue which is easily hydrolized, and those like *Cladonia*, which contain no lichenin, and the residue insoluble in water of which is hydrolized with difficulty.

Chailletia toxicaria, Constituents of. F. B. Power and F. Tutin. (*Journ. Amer. Chem. Soc.*, **28**, 1170.) *Chailletia toxicaria* is a native of Upper Guinea, Sierra Leone, and Senegambia. It is known as Ratsbane, "Broken-back"; the vernacular synonyms are "Magbevi" and "Manăk." Its fruit is employed as a poison for animals and as a homicide,

causing death by paralysis of the respiratory centres. No alkaloid, cyanogenetic glucoside or soluble proteid was found which could account for the toxic effect. The petroleum ether extract contained oleodistearin, $C_3H_5.(C_{18}H_{35}O_2)_2.C_{18}H_{33}O_2$ m.p. 43°C.; a phytosterol, $C_{26}H_{44}O$ m.p. 135–148°C.; stearic and oleic acid, and traces of formic and butyric acids. After removing these the alcoholic extract yielded, when precipitated with water, a resinoid body equivalent to 2·5 per cent. of the original fruit. This was toxic; it was separable by solvents into bodies possessing different physiological action. The chloroform soluble resin was narcotic or paralytic; the acetic ether soluble matter produced delirium and convulsions, while the subsequent solutions in alcohol after the successive use of the other solvents, although causing nausea, were not distinctly toxic. The aqueous liquid from the precipitation of the resins gave a syrup when evaporated *in vacuo*, and contained a large amount of glucose. It was very poisonous, producing, in small doses, delirium and epileptiform convulsions soon followed by death. It was not found to be possible to isolate this toxic substance from the accompanying glucose. The toxic effects of *Chailletia* fruits are not evident for some time after their ingestion, but after the onset of the symptoms death may occur in 15 minutes. It is evident that the fruit contains two toxic bodies, one of which causes cerebral depression or narcosis, the other cerebral excitation leading to convulsions. The latter is very slowly excreted so that a cumulative effect is produced by the administration of a series of individually innocuous doses.

Champaca, Essential Oil of. (*Schimmels' Report, October*, **1906**, 23.) A consignment of oil of reliable character had the sp. gr. 0·8861 at 15°C.; a_D—11° 10′; acid value, 10; ester value, 21·6; acetylisation value, 150 1; solubility in alcohol 70 per cent. 1 : 2, strongly turbid on adding more solvent, in 80 per cent. alcohol 1 : 1 opalescent with 1 : 7 due to separation of a paraffin. The light brown oil shows a faint bluish fluorescence in alcoholic solution, possibly due to the presence of an anthranilate. Linalol is apparently present.

Colchicine, Determination of. A. Panchaud. (*Schweiz. Woch. Chem. Pharm.*, **44**, 563.) Fifteen Gm. of coarsely powdered colchicum seeds is treated with 150 Gm. of $CHCl_3$ strongly

shaken for 30 minutes, when 6 c.c. of solution of AmOH 10 per cent. is added, and the whole well shaken for another 30 minutes; 100 Gm. of the $CHCl_3$ extract is then filtered off through a covered funnel into a tared flask and distilled to perfect dryness. The residue is taken up with 1 Gm. of dry $CHCl_3$ and 2 Gm. of dry Et_2O; to this 30 Gm. of petroleum ether is added. The precipitate is collected on a small filter, particles left in the flask being disregarded, and washed with petroleum ether. The funnel is then placed over the empty flask and the still moist precipitate is washed back into it with warm $CHCl_3$. The $CHCl_3$ is again distilled off and the dry residue dissolved in 15 drops of $CHCl_3$ is treated with 2 Gm. of absolute Et_2O and 30 Gm. of petroleum ether. The precipitated colchicine is collected on a tared filter. Any of the precipitate adhering to the flask is redissolved in 5 drops of $CHCl_3$ and precipitated with 1 Gm. of Et_2O and 10 Gm. of petroleum ether, and transferred to the rest on the filter; the flask and filter are then washed with petroleum ether and the latter is dried to constant weight and weighed. The weight $+0 \cdot 0022 \times 10$ gives the percentage of colchicine. It is important that all the solvents employed should be perfectly free from water.

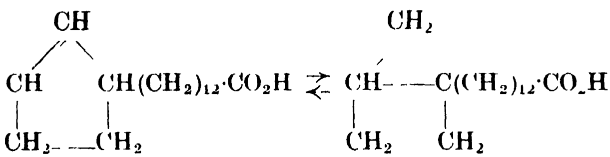
Chaulmoogric and Hydnocarpic Acids, Constitution of. M. Barrowcliff and F. B. Power. (*Journ. Chem. Soc.*, **91,** 557; *Pharm. Journ.* [4], **24,** 328.) Chaulmoogric acid, $C_{18}H_{32}O_2$ (m.p., 68°; $[a]_D + 56°$), and its lower homologue, hydnocarpic acid, $C_{16}H_{28}O_2$ (m.p., 60°; $[a]_D + 68$), the isolation and properties of which have been described (*Year Book*, **1904,** 49), have been further studied.

It has been shown that chaulmoogric acid, although isomeric with linolic acid, absorbs but two atomic proportions of iodine or bromine, and must therefore contain in its structure both a closed ring and an ethylenic linkage. By its oxidation in alkaine solution with limited quantities of potassium permanganate it affords a-dihydroxydihydrochaulmoogric acid, $C_{18}H_{32}O_2(OH)_2$ (m.p., 105°; $[a]_D + 11 \cdot 6°$), β-dihydyroxydihdrochaulmoogric acid, $C_{18}H_{32}O_2(OH)$ (m.p., 93°; $[a]_D - 14 \cdot 2]$), and ketohydroxydihydrochaulmoogric acid, $C_{18}H_{32}O_4$. Further oxidation gives on the one hand an optically inactive tricarboxylic acid, $C_{18}H_{32}O_6$ (m.p., 68°), which is n-pentadecane $aa'\gamma$-tricarboxylic acid—

$$CO_2H \cdot (CH_2)_2 \cdot CH \cdot (CO_2H) \cdot (CH_2)_{12} , CO_2H,$$

and on the other hand, formic acid and a keto-acid, $C_{17}H_{30}O_5$, which is shown to possess the formula $CO_2H\cdot(CH_2)_2\cdot CO(CH_2)_{12}\cdot CO_2H$. The latter compound, on oxidation, affords *n*-dodecane dicarboxylic acid $(CH_2)_{12}\cdot(CO_2H)_2$, and *n*-undecane dicarboxylic acid $(CH_2)_{11}\cdot(CO_2H)_2$. By the addition of hydrogen bromide to chaulmoogric acid and its subsequent elimination, an optically active mixture of acids is obtained, which, when oxidized, affords a keto-acid, $C_{18}H_{32}O_5$ (m.p., 126°), to which the formula, $CO_2H\cdot CH_2\cdot CH(Me)\cdot CO\cdot(CH_2)_{12}\cdot CO_2H$, is ascribed.

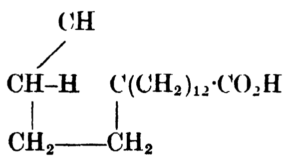
These results can be explained by considering that chaulmoogric acid exists in a state of tautomerism between the following two structures :—



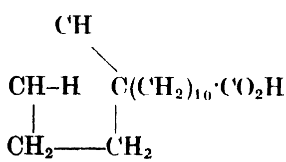
1-*a-carboxy-n-dodecyl* Δ^4 cyclo*pentene*

1-*a-carboxy-n-dodecyl* 1 : 4 bicyclo*pentane*.

Its constitution may therefore be represented by the following formula, in which the hydrogen atom connected with the dotted lines is considered to be in a state of equilibrium between two adjacent carbon atoms :—



Since hydnocarpic acid, on oxidation, affords products which are perfectly analogous to those obtained from chaulmoogric acid, its constitution is represented by the formula :—



Cheese, New Method of Determining Casein in. A. Trillat and — Sauton. (*Annales Chim. Analyt.*, **11**,

363.) Two Gm. of the cheese is treated with 10 c.c. of hot water and broken up with a glass rod; 50 c.c. more water is then gradually added. Hard cheeses may be disintegrated by rubbing down in a mortar, adding a very little ammonia to the water. The emulsion is then heated to boiling for 5 minutes; 0·5 c.c. of formalin is added, boiling being continued for another 3 minutes, and the mixture set aside for 5 minutes. The fat rises to the surface. The casein is then precipitated by the addition of 5 drops of acetic acid. When the supernatant liquid is clear, the friable white precipitate is collected on a tared filter, freed from fat by treatment with acetone in an extraction apparatus, and dried to constant weight at 70–80°C. The fat may be determined, if required, by evaporating the acetone extract in a tared vessel. The method is useful since it allows the degree of ripeness of cheese to be watched during the process of maturing. Thus, with Roquefort cheese the fresh product gave 19·48 per cent. of casein; in 8 days, 18·12 per cent.; in 15 days, 11·65 per cent.; in 30 days, 8 per cent.; in 60 days, 7·10 per cent. The following percentages of casein were found in commercial cheeses, in the moist condition, as sold:—Camembert, 18·2; Guyère, 31·34; Gervais, 6·4; Brie, 21·9; Roquefort half ripe, 11·65; Roquefort very ripe, 7·1; Dutch, 31·5.

Chenopodium anthelminticum, Essential Oil of. E. Kremers. (*Pharm. Review*, **25**, 5.) Six specimens of American wormseed oil had sp. gr. ranging from 0·8618 to 0·991. The optical rotation in a 50 Mm. tube varied from $-1° 53'$ to $-3° 17'$. Three of these oils gave saponification values from 3·6 to 14·5 and acetyl values from 246 to 259; but from the behaviour of the oil during acetylization other chemical changes than mere esterification seem to occur. When an attempt was made to fractionate the oil violent decomposition occurred when the boiling point was approached. The same occurred when the oil was first saponified and then rectified with steam. On attempting to fractionate this rectified oil a violent explosion, due to water being split off, occurred when the boiling point was reached, while a peculiar minty odour was developed. It is probable that the oil contains a large percentage of a very unstable alcohol. A solution of wormseed oil in glacial acetic acid is coloured green by ethyl nitrite, the colour being changed to blue on adding a drop of HCl.

Chloral, New Reaction for. E. Covelli. (*Chem. Zeit.*, **1907,** 342; *Apoth. Zeit.*, **1907, 22,** 267.) One c.c. of castor oil is heated in a porcelain capsule on the water-bath for 10 minutes; a piece of antimony trichloride, the size of a pea, is then immersed in the warm oil. An orange-yellow resinous mass is thus obtained. If a trace of chloral hydrate be dropped on this while still on the water-bath, a greenish blue spot extending to a deep-coloured zone is obtained. If the chloral hydrate be first dissolved in castor oil with heat, and antimony trichloride be added to the solution, a similar coloured ring is formed round the salt in 5 to 15 minutes. The test may be applied to aqueous solutions of chloral hydrate by shaking out these with ether, mixing the ether extract with 1 or 2 c.c. of castor oil and evaporating the volatile solvent on the water-bath. The blue colouring matter is soluble in chloroform, and is precipitated, without alteration, by the addition of water to the solution. Boiling alcohol discharges the colour; on filtering and evaporating the alcoholic solution, a yellow residue is obtained, which again becomes greenish blue on being heated over a naked flame, or when treated with sulphuric acid. The colour is also discharged by caustic alkali, but is regenerated when the alkali is treated with excess of strong sulphuric acid.

Chlorides, Determination of, by Volhard's Method. A. Rosanoff and A. E. Hill. (*Journ. Amer. Chem. Soc.*, **29,** 269.) Difficulty is often found in reading the end point during titration of chlorides by Volhard's method. This is due to the decomposition of the AmCNS by the AgCl present. Comparative experiments show that this change is very large, so that to obtain reliable results it is essential that after adding excess of $AgNO_3$ solution the AgCl should be filtered out and the titration of the excess of silver performed with the AmCNS and iron alum indicator in the filtrate. In the case of bromides and iodides, this filtration is not necessary.

Chlorinated Soda Solution. R. C. Cowley. (*Pharm. Journ.* [4], **23,** 540.) A solution richer in available chlorine is obtainable by shaking the prescribed quantity of chlorinated lime with the water, then adding a solution twice as much sodium carbonate as of chlorinated lime, taken and filtering rapidly. The amount of water ordered might be increased, since with the quantity at present ordered an almost pasty

precipitate results in cold weather. If the precipitate subsides readily, filtration should be avoided.

Cinchona Bark, African. O. Hesse. (*Apoth. Zeit.*, **22,** 97.) Cinchona bark from trees grown from Javan seed at Amani in German East Africa, hybrids of *C. ledgeriana* and *C. succirubra* four years old, have yielded from 6·4 to 6·8 per cent. of quinine sulphate.

Cinnamic Acid, Isomeric Forms of. E. Erlenmeyer, Junr. and C. Barkow. (*Berichte*, **39,** 1570; *Schimmels' Report, October*, **1906,** 150.) Cinnamic acid obtained from the oil of *Alpinia malaccensis* crystallizes in small leaflets, that isolated from Honduras balsam in small fine curved needles. The latter is a new form. Six right forms of cinnamic acid are now known, iso-cinnamic acid of E. Erlenmeyer, sen.; allo-cinnamic acid, iso-cinnamic acid of Liebermann, triclinic cinnamic acid, and α- and β-cinnamic acids from storax, iso-cinnamic acid from the more soluble brucine salt, and the synthetic acid.

Cinnamon, Essential Oil of. (*Evans' Analyt. Notes*, **1907,** 13.) Many of the cinnamon oils of commerce are still found to contain abnormal amounts of cinnamic aldehyde.

The first table below shows a few recent observations.

	Specific gravity	Rotation	Eugenol	Aldehyde
1	1 066	+0°30′	—	84 per cent.
2	1·042	—0°48′	11 per cent.	80 ,,
3	1·039	—0°40′	6 ,,	84 ,,
4	1·039	—1°′	7 ,,	80 ,,
5	1·039	—0°32′	12 ,,	81·6 ,,

The five genuine samples which follow contrast very favourably with those given above:

	Specific gravity	Rotation.	Eugenol.	Aldehyde.
1	1 0256	—0°34′	—	72·10 per cent.
2	1 0289	—0°30′	4 per cent.	73 6 ,,
3	1 026	—0°28′	10 ,,	76 ,,
4	1 028	—0°24′	—	82 ,,
5	1 026	—0°30′	10 ,,	75 ,,

Leaf oil adulterants are still sometimes seen.

The following was an oil of German origin labelled "Ol. Cinnamomi Ver., No. 2." S.g. 1·048. Rot.—0°40′. Phenols 55 per cent. Aldehyde 22 per cent. With ferric chloride: bluish green.

Cinnamomum loureirii, Essential Oil of. K. Keimatsu. (*Pharm. Journ. Jap.*, **1906,** 105; *Schimmels' Report, October*, **1906,** 23.) *Cinnamomum loureirii* is indigenous to the province of Ki-i in Japan. The oil distilled from the leaves contains chiefly citral, with small quantities of eugenol. The oil from the root, however, was quite different. The chief constituent was cinnamic aldehyde with camphene cineol and linalol. [See also *Year-Book.* **1905,** 59.]

Cinnamomum pedunculatum, Essential Oil of. K. Keimatsu and S. Asabrina. (*Oriental Drugg.*, **1,** [3]; *Schimmels' Report, April*, **1907,** 28.) This oil is quite different from ordinary cinnamon oil; sp. gr. 0·917; $[\alpha]_D$ − 280° 54 (?) it contained no free acid or ester; acetyl value, 84 6. It contains much phellandrene, with a little eugenol and methyl-eugenol.

Cinnamon and Cassia Barks, Amount of Calcium Oxalate in. J. Hendrick. (*Analyst*, **32,** 14.) Ceylon cinnamon bark contains at least twice as much calcium oxalate as cassia bark; and the bark of "wild cinnamon," also used as a cheap adulterant of Ceylon cinnamon, contains yet more, nearly twice as much as true cinnamon. The determination of the amount of calcium oxalate in a specimen of powdered cinnamon affords, therefore, a useful criterion of its quality. To effect this 5 Gm. of the powdered bark is digested in dilute HCl, filtered, evaporated to a small bulk, again filtered, nearly neutralized with AmOH, heated to boiling and made alkaline with AmOH. It is then acidified with acetic acid and boiled for some time; the coloured precipitate is collected, washed, dried, and strongly ignited, the residue being weighed as CaO. The following table represents the results obtained with various kinds of cinnamon and cassia barks.

Sample.	Total Ash.	Water Soluble Ash.	Water Insoluble Ash.	Silica.	Calcium Oxalate.	Lime in Oxalate.	Lime in other forms.
	Per cent	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Broken Ceylon Cinnamon .	5·12	0·96	4·16	0·29	3·37	1·47	0·43
Cinnamon Chips, Ceylon	5·24	0·95	4·29	0·25	3·81	1·67	0·36
Wild Cinnamon, Ceylon	7·29	0·88	6·41	0·11	6·62	2·90	0·48
Cassia No. 1, Japan . .	3·01	0·95	2·06	0·33	0·77	0·34	0·37
Cassia No. 2, Japan . .	3·9	0·95	3·02	0·14	1·34	0·58	0·83
Cassia, China.	2·54	0 91	1·63	0·31	0·05	0·02	0·42
Cassia lignea .	2·34	0·69	1·73	0·31	0·06	0·02	0·54
Cassia vera, Pandang .	6·3	1·33	4·95	1·63	1·23	0·54	0·90
Ground Cinnamon, 1 . .	5·21	0·86	4·35	1·04	3·09	1·35	0·32
Ground Cinnamon, 2 . .	—	—	—	—	2·76	1·21	—
Quill Cinnamon	—	—	—	—	2·5	1·10	—
Ground Cassia, 1 . . .	2·75	0·65	2·10	0·55	0·85	0·37	0·27
Ground Cassia, 2 . . .	—	—	—	—	0·20	0·09	—
Quill Cassia .	—	—	—	—	0·41	0·18	—

The last four samples were purchased from retail druggists.

Citronella, Essential Oil of, Conditions of Production. A. Joyasuriya. (*Oil Paint and Drug. Report*, **70,** 25; *Schimmels' Report, October*, **1906,** 24.) The mother plant of the varieties of citronella grass is *Andropogon nardus.* Four different varieties occur which are separated into two groups, "maha pangiri" and "lanabatu." The former gives a rich yield of fine oil, but requires a comparatively rich soil and much care in cultivation. The "lanabatu" plants give a poorer yield of less aromatic oil but the plant thrives on poorer soil and does not require transplanting. The bulk of Cingalese oil is derived from "lanabatu" plants, and consequently is of less commercial value than the oil produced in Java and Singapore from "maha pangiri" plants. The wider cultivation of this variety in Ceylon is advocated. Fresh grass is not distilled, for the oil yielded therefrom is rank in odour. Well dried grass alone is employed for the purpose. It is cut three or four times a year; the yield of oil increases up to the third year, after which it

diminishes. The maximum yield is about 71 lb. per acre. According to Wright, the residual grass, after extracting the oil, is suitable for papermaking.

Cloves, Essential Oil of, Adulterated. (*Schimmels' Report, October*, **1906,** 27.) A sample of Bohemian origin was found to be adulterated with 60 per cent. of gurjun balsam oil. It contained only 32 per cent. of eugenol.

Coca, Javan, Constituents of. — de Jong. (*Zeits. angew. Chem.*, **1907,** 82; *Pharm. Centralh.*, **48,** 273.) Javan coca leaves contain cocaine, η-, iso-, and allo-cinnamyl cocaine, a-, δ- and ϵ-isotropyl cocaine; traces of benzoyl pseudotropeine and hygrine. By treatment with alkali these bases are split up into ecgonine and pseudotropine; benzoic η-, iso-, and allocinnamic acids, also into a-, δ- and ϵ-isotropaic acids. Crude Javan cocaine alkaloid is found to yield from 54·73 to 55·27 of ecgonine.

Cocaine Hydrochloride, Decomposition of, by Keeping. P. Breteau. (*Bull. Soc. Chim.*, **35,** 674.) A specimen of cocaine hydrochloride which had been kept for about 15 years, was found to have decomposed, forming methyl benzoate, free benzoic acid and ecgonine hydrochloride. The decomposition is attributed to a trace of water retained by the lamellar crystals in which the salt was prepared in the earlier days of its commercial production. The anhydrous salt as now met with would not be so liable to undergo change; but it is essential that it should be carefully stored in well stoppered bottles, free from access of moisture.

Cochineal, Colorimetric Valuation of. *Caesar and Loretz's Report; Pharm. Centralh.*, **47,** 1072.) One Gm. of dried powdered cochineal is heated on the water-bath for 30 minutes with 5 Gm. of KOH and 20 c.c. of water; the liquid is cooled, made up to 100 c.c and filtered. A solution of 0·316 Gm. of $KMnO_4$ in 1,000 c.c. of distilled water is prepared; 12·5 c.c. of this is made up to 100 c.c. in a graduated Nessler glass. The colour of this is then matched in the usual manner in another Nessler glass, with a known volume of the cochineal solution. With cochineal of normal strength, 2·5 c.c. of the solution will be sufficient.

Cochlospermum gossypium Gum. H. H. Robinson. *Proc. Chem. Soc.*, **22,** 314.) The gum of *Cochlospermum gossypium* resembles tragacanth in absorbing large quantities of water, greatly increasing in bulk. It also has the property of slowly giving off acetic acid. On hydrolysis with dilute H_2SO_4 a dibasic acid, $C_{23}H_{36}O_{21}$, is formed which has been named gondic acid. It is soluble in water from which it is precipitated by alcohol; it has adhesive properties, $[\alpha]_D + 97 \cdot 7°$. Its salts are formed by addition, not by replacement; thus the barium salt is $C_{23}H_{36}O_{21}BaO$. After separation of gondic acid, two sugars were obtained from the mother liquor: one of these was xylose and the other a hexose, probably galactose. The original gum yielded 14 per cent. of acetic acid. By prolonged treatment with cold NaOH solution, acidifying and dializing, a clear viscid colloid solution was obtained containing a de-acetylated product which can be precipitated by alcohol in presence of HCl. This has been named *a*-cochlosperminic acid. It gelatinizes, but does not dissolve in water.

Coconut Fat, Detection of, in Butter. E. Hinks. *Analyst*, **32,** 160.) Five c.c. of the melted and filtered fat is dissolved in twice its volume of ether in a tube, and packed in ice; in half an hour the clear ether solution is decanted from the separated fat on to a plaited filter and the filtrate is evaporated. The residual fat is then boiled with 3 or 4 times its volume of 96 to 97 per cent. alcohol when complete solution takes place. The solution is cooled to the ordinary temperature, when most of the fat separates out. The tube is then immersed in water at 50°C. for 15 minutes. It is then quickly filtered into another tube which is kept in a cooled chamber at 0°C. A flocculent deposit soon separates; after 2 or 3 hours this is examined microscopically. The glycerides deposited from pure butter under these conditions show as round granular masses; pure coconut oil gives fine needle-shaped crystals. In mixtures of coconut fat with butter numerous small almost feathery crystals are seen, either attached to the butter spheres or in clusters by themselves. Five per cent. of coconut fat may be detected by this test. The presence of 10 per cent. of beef fat, cotton seed or sesame oils does not mask the presence of coconut fat, but the presence of lard does interfere. Lard yields stellate crystals when treated as above, which may be distinguished from those of coconut fat, although they are somewhat similar.

Coconut Fat, Detection of Small Quantities of, in Butter. J. Bellier. (*Rev. Internat. Falsific.*; *Apoth. Zeit.*, **22,** 248.) A standard solution is made with 21·850 Gm. of pure $CuSO_{45}H_2O$ and 50 Gm. of pure Na_2SO_4 dissolved in 1,000 c.c. of water; 20 c.c. of this will precipitate all the insoluble fatty acids of 1 Gm. of butter under the conditions described.

Exactly 1 Gm. of dry filtered butter is weighed off into a stoppered Erlenmeyer flask with 5 c.c. of alcoholic N/KOH solution and kept at a temperature of 60–70°C. with occasional agitation. It is then titrated with $N/_2H_2SO_4$ solution, with phenol phthalein indicator to determine the saponification number. The slight excess of acid is neutralized with a drop of alkali; 20 c.c. of the $CuSO_4$ solution is then run in. The mixture is heated on the water-bath at 80°C. until the precipitate has aggregated, after which it is allowed to cool. The liquid is then filtered through a dry tared filter, and the filtrate tested with a drop of the $CuSO_4$ reagent. In the case of pure butter, no precipitate, or only the barest trace, will be formed. If a precipitate, soon aggregating to flocks, is formed, coconut fat up to 10 per cent. is present. If there be more than 10 per cent. an immediate dense precipitate is formed which falls to the bottom of the vessel. For a quantitative determination, the above method is followed, but excess of the $CuSO_4$ solution is added. The precipitate is collected on a dry tared filter and washed until the filtrate gives no precipitate in 10 minutes with $BaCl_2$. The filter and precipitate are then dried to constancy, and weighed. Pure butter gives 0·99 Gm., margarine and lard 1·050 to 1·060 Gm. It is then transferred to a porcelain crucible and ashed to complete oxidation. Pure butter, margarine and lard give from 0·141 to 0·142 Gm. of CuO; coconut fat gives 0·177 to 0,178 Gm. Consequently every excess of 0·00036 Gm. over 0·142 Gm. indicates the presence of 1 per cent. of coconut fat. Obviously, the original butter must be weighed out with great accuracy, and the copper solution should be standardized with a mixture of pure butter containing 5 per cent. of coconut fat.

Coconut Fat and Margarine, Detection of, in Butter. L. Robin. (*Annales Chim. Analyt.*, **11,** 454; *Analyst.*, **32,** 48.) Since the fatty acids of coconut fat are almost entirely soluble in alcohol 56·5 per cent., while those of pure butter are almost insoluble, this difference serves to detect the admixture

of the former with the latter. Five Gm. of the fat is saponified by boiling for 5 minutes under a reflux condenser with 25 c.c. of alcoholic KOH solution. Water is then added to the cooled solution so as to bring the alcohol strength to 56·5 per cent. The fatty acids are then liberated with $N/_2HCl$ solution made with alcohol 56·5 per cent.; the requisite amount of this acid having first been found by a blank titration of another 25 c.c. of the alcoholic KOH solution used. The liquid is cooled, made up to 150 c.c. with 56·5 per cent. alcohol, and maintained at 15°C. for at least 30 minutes. The insoluble fatty acids are then filtered out; 50 c.c. of the filtrate is then titrated with $N/_{10}$ KOH solution; the result, expressed as numbers of c.c. for each 1 Gm. of original fat, gives the figure for fatty acids soluble in alcohol 56·5 per cent. Another 50 c.c. of the filtrate is evaporated on the water-bath to drive off the alcohol; the separated fatty acids are collected, washed 4 times with water at 50 to 60°C., dissolved in a mixture of alcohol 95 per cent. 2, ether 1, and the solution is titrated with $N/_{10}$ KOH solution. The result gives the figure for fatty acids insoluble in water. The figure for fatty acids soluble in water is then found by difference. The ratio of $\frac{\text{soluble in water}}{\text{insoluble in water}} \times 10$ is found to lie with pure butter between 13·9 × 8·3 with a mean of 10·3.

The following are typical samples selected from a long table of analysis.

Fatty Acids.	Soluble in Alcohol	Insoluble in Water.	Soluble in Water	Ratio $\frac{\text{insoluble in water}}{\text{soluble in water.}} \times 10$
	Per cent.	Per cent.	Per cent.	
Margarine . .	2·67	2·56	0 11	232·7
Coconut oil . .	46 69	44·71	1·98	225·8
Coconut oil . .	47·20	45·40	1 80	252·2
Butter, maximum	15·50	9·05	6·47	13·9
Butter, minimum	11·67	5·51	5·92	8·3

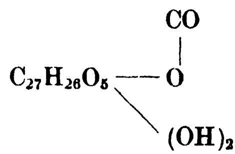
Coconut oil is regarded as certainly present when the "water soluble" figure falls below 5·92 and the "ratio" at least = 13 or whenever the sum of the ratio and the "soluble in alcohol" figure exceeds 30. When margarine is present the "water soluble" figure will be less than 5·92 and the ratio less than 13.

Coconut Fat, Detection of, in Lard. L. Robin. (*Annales Chim. Analyt.*, **12,** 87.) The method previously described also serves to detect admixture of coconut fat with lard. In lard so adulterated the "alcohol soluble" figure is at least equal to 3; with pure lard it is from 2·42 to 2·65. The ratio $\frac{\text{insoluble in water}}{\text{soluble in water}} \times 10$ is below 200; with pure lard it is from 205 to 400, and the ratio $\frac{\text{saponification value}}{\text{soluble in alcohol}}$ is below 65, with pure lard it ranges from 73 to 80. The figure for water soluble fatty acids is above 20, with pure lard it is below 15. When the ratio of $\frac{\text{saponification value}}{\text{soluble alcohol}}$ is 50 to 65, 5 per cent. of coconut fat is present; when it is 40 to 50, 10 to 15 per cent.; with 30 to 40, 15 to 20 per cent. of the adulterant is present, A table of detailed results obtained with different mixtures of lard and coconut fat is given.

Columbin. T. Ulrich and O Frey (*Oesterr. Zeit. Pharm.*, 1907, [6] and [7] through *Schweiz. Woch. Chem. Pharm.*, **45,** 157.) Ulrich finds that columbin has the formula $C_{28}H_{30}O_9$. Columbic acid does not exist as such in calumba root, but is formed by the action of alkali. Frey states that columbin is a lactone of a monobasic acid

$$C_{27}H_{30}O_7{<}\begin{matrix}OH\\COOH\end{matrix}$$

and since it contains two alcoholic or phenolic hydroxyl groups, the formula is probably



This formula demonstrates the function of the four oxygen atoms and explains the behaviour of columbin with bromine. (See also *Year-Book*, **1896,** 98.)

Coniferae, Essential Oils of some American. R. E. Hanson and E. N. Babcock. (*Journ. Amer. Chem. Soc.*, **28,** 1198.) *Pinus mariana*, "Black spruce," leaves yielded 0·57

per cent. of oil with the sp. gr. 0·9274 at 19°C. *Tsuga canadensis*, "Hemlock," gave from the needles and twigs 0·4 per cent. of oil, sp. gr. 0·9238 at 15°C. *Picea canadensis*, "Cat spruce," yielded 0·103 per cent., sp. gr. 0·9216 at 15°C.; ester content 25·7 per cent. expressed as bornyl acetate. The odour of this oil is different from that of those mentioned above, and suggests the presence of limonene or dipentene. *Picea rubeus*, "Red spruce" needles, gave 0·204 per cent. of oil, sp. gr. 0·9539 at 16°C.; it contains 66·2 per cent. of bornyl acetate and 7·76 per cent. of free borneol, so that on saponification large quantities of borneol separate out in a crystalline condition. The oil distilled from the cones had the sp. gr. 0·8600 at 15°C. and was golden yellow; its odour resembled that of fir balsam. The yield was 0·38 per cent.

Larix americana, "American larch," yielded 0·149 per cent. of oil, sp. gr. 0 8816 at 15°C.; esters = 15·1 per cent. of bornyl acetate; the remainder is chiefly pinene.

Picea canadensis, "White spruce" cones, gave 0 25 per cent. of yellow oil, sp. gr. 0·899 at 15°C., some time after distillation; the odour is pronouncedly like limonene.

Pinus rigida needles and twigs, "Pitch pine," only gave a trace of yellow oil with a pungent odour; similarly *Pinus resinosa*, "Red pine," only gave a minute quantity of brownish red pungent oil. *Juniperus communis* leaves and twigs free from berries gave 0·15 to 0 18 per cent. of light yellow oil, sp. gr. 0·8531 at 20°C. *Juniperus virginiana* gave oil with the sp. gr. 0·900.

Conine, New Reaction for. E. Gabutti. (*Boll. Chim. Farm.; Journ. Pharm. Chim.* [6], **24**, 423.) If a very dilute solution of sodium nitroprusside be added to a dilute aqueous solution of conine a currant-red colour is quickly formed; on boiling, this disappears, but reappears when the liquid cools. The presence of alcohol prevents the formation of the colour and the addition of acid discharges it; alkalies turn it yellow. If the nitroprusside solution be added to an ether solution of conine the aqueous portion alone shows the red colour, the reaction is slower and less delicate. Piperazine, piperidine, and the amines of the fatty series do not give the reaction. With nicotine only a very faint barely perceptible red tint appears after a time.

Copaiba Oleoresin. (*Southall's Report*, **1907,** 10.) A large proportion of the balsams met with on the market during the current year have failed to pass the official tests. From 11 specimens which responded to the B.P. colour tests the following analytical data were obtained :—Sp. gr., 0·9679 to 1·0108 ; resin, 36·4 to 64·9 per cent. ; acid value, 47·44 to 91·81 ; ester value, 3·0 to 8·7 ; resin acid value, 0·61 to 0·79.

Another sample of balsam was expressed from capsules offered at an exceptionally low price, and gave results which would appear to indicate gross adulteration :—Sp. gr., 0·9507 ; resin (soft in character), 42·22 per cent. ; acid value, 35·8 ; ester value, 17·0 ; resin acid value, 1·185. Official colour tests, deep purple.

Copaiba Oleoresin, Adulterated. G. W. Marris. (*Pharm. Journ.* [4], **23,** 720.) A cheap copaiba has recently appeared on the market offered as "B.P. Balsam of Copaiba," which passed all the official tests except in the rotation of the volatile oil. This had a lower rotation than the oil of genuine copaiba, which became more evident on fractional distillation ; and by refractionation a petroleum oil was isolated. The balsam itself passed the B.P. colour tests, but the oil gave an immediate violet colour with nitric acid in glacial acetic acid. The oil, too, was practically insoluble in 99 per cent. acetic acid. The balsam itself, when 1 drop was dissolved in 5 c.c. of acetic anhydride, gave at first a brownish-green colour with 1 drop of H_2SO_4, which changed rapidly to rich purple or violet, then indigo, and finally bluish-green, which was persistent.

Copaiba Oleoresin, Detection of Colophony in. L. E. Walbum. (*Apoth. Zeit.*, **21,** 953.) Although the ammonia test for colophony, depending on the gelatinization, is satisfactory in the presence of a considerable amount of the adulterant, it fails to detect admixtures below 6 or 8 per cent. The following method will show the presence of 1 or 2 per cent. It depends on the production of a deep brown colour when colophony comes in contact with ammonia. Two twin tubes are taken, and in one 2 Gm. of the copaiba is dissolved in 5·5 c.c. of absolute alcohol. This solution is kept as a standard. In the other tube, a mixture of 4·5 c.c. of solution of ammonia (1 per cent. of NH_3), 1 c.c. of acetone, and on this mixture is poured a solution of 2 Gm. of the copaiba in 6 c.c. of ether. The whole is then thoroughly shaken up, then set aside for half an hour. The

separated lower aqueous layer is then compared in colour with the standard aqueous solution. If it is darker, the copaiba contains colophony. Gurjun balsam, Canada balsam, mastic damniar, copal, and sandarac impart no colour to the aqueous layer when thus treated. By preparing standard solutions with Bismarck brown corresponding to the colour given by this test with admixtures of colophony and copaiba in known proportions, an approximate quantitative determination may be made.

Copals, American. C. Coffignier. (*Bull. Soc. Chim.* [3], **35,** 1143.) *Demarara copal,* from British Guiana, in lengthened pieces with a smooth, flat or nippled surface; some pale yellow, others reddish; fracture clean and very bright. It is very hard and resembles Inada gascar copal. When freshly powdered it has a pronounced odour of valerianic acid; this odour is distinctive of this copal. Sp. gr., 1·047; m.p., 180°C.; acid value, 9·77; Koettestoffer value, 102·4. Percentage of insoluble matter by boiling with alcohol, 72·1; with ether, 55·4; with methyl alcohol, 77·4; with benzol, 70·9; with acetone, 69·2; with amyl alcohol, 53; with chloroform, 56·9; with aniline, 73·9; with benzaldehyde, 50·2; with carbon tetrachloride, 75.5; with amyl acetate, 37·1.

Columbia copal is dusty, in irregular pieces, some of which are yellowish-white, fairly clean, glassy, bright, not very hard and easily broken. The pieces generally contain foreign matter, other pieces are reddish-brown, a few are milky, others are covered with a crusty layer several mm. thick. It is generally very dirty. The solubilities are generally much greater than those of Demarara copal; it leaves the following percentages of insoluble matter on boiling: with alcohol, 17; ether, 50; methyl alcohol, 60; benzol, 60·8; acetone, 43·6; amyl alcohol, 4·9; chloroform, 54·7; aniline, 2·2; benzaldehyde, 18·3; carbon tetrachloride, 69·6; oil of turpentine, 68·7; amyl acetate, 6.

Brazilian copal occurs in rounded pieces of different colours; the surface is generally smooth but rarely roughened; fracture clean, vitreous and brilliant. It is not very hard, powders easily, and is very clean. Sp. gr., 1·053; m.p., 100°; acid value, 123; Koettestoffer value, 133·3. Percentage of insoluble matter: with alcohol, 30·2; methyl alcohol, 50; amyl alcohol, 1·8; ether, 29·7; chloroform, 36; benzol, 40·5; acetone, 37·6; oil of turpentine, 48·2; benzaldehyde, 26·7; aniline, 8·3; amyl acetate, 3·4; carbon tetrachloride, 44·9.

Copper and Iron, Delicate Test for Traces of. S. K. Kahn. (*Proc. Amer. Pharm. Assoc.*, **1906**, 402.) Thirty c.c. of the liquid to be tested is heated with 2 Gm. of colourless stearic acid in a test tube, and shaken up thoroughly for 5 minutes. The tube is then set aside for the fatty acid to solidify; the disc of fat is then removed and the colour compared with a similar disc melted over distilled water. In the presence of copper a more or less distinct green shade is evident; it is claimed that the presence of Cu 1 : 1,000,000 may be thus detected.

Iron under similar conditions gives a yellow tint, the test in this case being sensitive to detect Fe in the proportion of 1 : 800,000.

Coriander, Essential Oil of, Adulterated. (*Schimmels' Report, October*, **1906**, 29.) Coriander oil is frequently adulterated on account of its high price. A specimen has been examined having the following characters :—Sp. gr., 0·8752; a_D + 33·29; saponification value, 5·5; insoluble in alcohol 70 per cent., 1 : 10. The high rotation and insolubility in alcohol at once indicate sophistication. (See also *Year-Books*, **1888**, 185; **1895**, 167).

Cotarnine, Melting Point of. D B. Dott. (*Pharm. Journ.* [4], **24**, 78.) The hydrated base to which Matthieson and Forster gave the formula $C_{12}H_{13}NO_3+H_2O$, melts at about 125°C. with decomposition. When placed on the water-bath the loss of weight was found to be more than equivalent to 1 Mol H_2O, and partial fusion occurred. A little of the base in a watch-glass darkened and gradually melted at 100°C. Previous statements as to the m.p. have varied from 100°C. to. 132°C. It is evident that the m.p. is variable according to conditions, and is not reliable as a test of the purity of the alkaloid.

Cotoneaster microphylla, Prulaurasin in. H. Hérissey. (*Journ. Pharm. Chim.* [6], **24**, 475.) Prulaurasin has been isolated from the leaves and stems of *Cotoneaster microphylla*, by the method employed with the leaves of *Prunus lauro-cerasus*. (*Year-Book*, **1906**, 64).

Cousso, Active Principles of. E. Reeb. (*Journ. Pharm. Elsass Lothring.* and *Nouveaux Remèdes*, **23**, 130.) Cousso

flowers were extracted with ether, and the ethereal extract evaporated to dryness. Each 10 Gm. of residue thus obtained were rubbed down with a solution of 60 Gm. of chloral hydrate in 40 c.c. of water. The mixture was filtered and the insoluble matter washed with a similar chloral hydrate solution. The chloral hydrate extract was then shaken out with petroleum ether, until the latter was no longer coloured. The bulked petroleum ether solution was evaporated to dryness and the residue dissolved in hot alcohol 95 per cent. This alcoholic solution deposited crystals on standing for about 15 days. This crystalline body proved to be the protocosoin of Leichsenring (*Year-Book*, **1902**, 66), but it had the m.p. 170°C. only. It is nontoxic to frogs. The mother-liquors from these crystals were evaporated to dryness, the residue dissolved in ether, and the ethereal solution shaken out with 25 per cent. sodium carbonate solution. The alkaline liquid was acidified with acetic acid and again shaken out with ether. The ethereal solution was evaporated, the residue heated on the water-bath until all acetic acid was driven off. The product thus obtained was a bright yellow pulverulent amorphous body, m.p. 65°C.; it was powerfully toxic, 0·004 Gm. killing a frog in ten minutes. The portion insoluble in chloral hydrate solution was extracted with petroleum ether, and the residue obtained from that solvent redissolved in ether was treated as above with sodium carbonate; an amorphous product resembling the former in properties and toxicity, but having the m.p. 72°C. was obtained. Both these amorphous bodies in alcohol give a purple colour with $FeCl_6$ solution, and a red colour with strong H_2SO_4. Protocosin exists as such in the plant, since it is removed by simple direct solvents; but the two amorphous bodies are decomposition products since they are only obtained by the action of Na_2CO_3.

Cyanogenetic Glucosides, Plants containing. P. Jitschy. (*Journ. Pharm. Chim.* [6], **24**, 355.) In addition to the plants already recorded as containing cyanogenetic glucosides, the following Belgian-grown species are found to give hydrocyanic acid when distilled:—*Ranunculus repens* gave 0·00877 per cent. of HCN from the fresh herb; *Gynerium argenteum*, 0·02307 per cent.; *Melica altissima*, 0·01543 per cent.; *M. nutans*, 0·01821 per cent.; *M. uniflora*, 0·00726 per cent.; and *M. ciliata*, 0·01014 per cent.

Cyclea peltata, Active Principle of. A. Sutterpain. (*Pharm. Zeit.*, **51,** 758.) *Cyclea peltata* contains the alkaloid cycleine $C_{27}H_{31}N_2O_4$, m.p. 214°C. It is extracted by ether and recrystallized from acetone, from which it separates in silky needles with 1 mol. of acetone of crystallization, m.p. 145°C. It parts with this acetone in 2 hours at 95°, when the m.p. rises to 214°C. It dissolves in H_2SO_4, giving a yellow solution turning wine-red when heated. It is a heart poison. (See also *Year-Book*, **1898,** 131.)

Cyclogallipharic Acid, Salts of. H. Kunz-Krauze and R. Richter. (*Archiv. der Pharm.*, **245,** 28.) Neutral alkali salts of cyclogallipharic acid (*Year-Book*, **1904,** 75) are obtained by digesting an aqueous solution of the hydroxide with excess of the acid, concentrating and crystallizing. The *potassium* salt $KC_{21}H_{35}O_3$ occurs in fine, colourless, hair-like felted needles, m.p. 73·5°C. The *calcium* salt, $Ca_2C_{21}H_{35}O_3$, and the *barium* salts, $Ba2C_{21}H_{35}O_32H_2O$ obtained by double decomposition; the latter melts at 121°C.

Cadmium cyclogallipharate, $Cd2C_{21}H_{35}O_3$, is a white amorphous powder, m.p. 135·5°C.

Copper cyclogallipharate, $Cu2C_{21}H_{35}O_3H_2O$, is a light green amorphous powder. *Mercuric cyclogallipharate*,

$$C_{20}H_{31}\begin{smallmatrix}\diagup OH \\ \diagdown COOHg\end{smallmatrix} + 3H_2O$$

is a yellowish body.

The *lead* salt obtained by the interaction of neutral lead acetate solution, and potassium cyclogallipharate has the constitution

$$\left[\left(C_{20}H_{34}\begin{smallmatrix}\diagup OH \\ \diagdown COO\end{smallmatrix}\right)_2 Pb\right]_4 . Pb\begin{smallmatrix}\diagup OH \\ \diagdown OH\end{smallmatrix}$$

On treating the alcoholic solution of the free acid with alcoholic $Pb_22C_2H_3O_2$ an amorphous precipitate and a crystalline lead compound are obtained. The former has the constitution

$$\left[\left(C_{20}H_{34}\begin{smallmatrix}\diagup OH \\ \diagdown COO\end{smallmatrix}\right)_2 Pb\right]_3 . Pb\begin{smallmatrix}\diagup OH \\ \diagdown OH\end{smallmatrix}$$

The crystalline body contained only 2·55 per cent. of Pb, or one-tenth the amount required by the formula for the neutral salt

$$\left(C_{20}H_{31} \langle {}^{OH}_{COO} \right)_2 Pb.$$

The iron salt, obtained by the interaction of neutral alkali cyclogallipharates, and of Fe_2Cl_6, is not the true ferric salt, but contains one hydroxyl group as shown by the formula

$$Fe \begin{cases} OH \\ C_{21}H_{35}O_3 \\ C_{21}H_{35}O_3 \end{cases}$$

Elaterin. H. Thoms and A. Mann. (*Apoth. Zeit.*, **21,** 803), and F. von Hemmelmeyer. (*Apoth. Zeit.*, **22,** 154, after *Monats. Chem.*) Thoms and Mann attribute the formula $C_{20}H_{30}O_6$ to elaterin, which melts at 232°C., and has the $a_D -41° 89'$ when purified by recrystallization from alcohol. It behaves as a lactone and has aldehydic functions. When heated with zinc dust it forms a-methyl naphthalin $C_{10}H_7.CH_3$. With H_2O_2 it gives dioxy-elaterin, and with HNO_3 orthophthalic acid is formed. Elaterin therefore contains a naphthalin nucleus. Von Hemmelmeyer finds that pure elaterin recrystallized from alcohol melts at 225°C., and has the formula $C_{24}H_{34}O_6$, and not $C_{20}H_{38}O_5$, as found by Zwenger. When treated with Br. in solution in $HC_2H_3O_2$ it forms the monobromo-compound $C_{24}H_{38}BrO_6$. On acetylizing it gives a diacetyl-derivative. When boiled with dilute alcoholic H_2SO_4 it is split up into a elateridin, $C_{22}H_{30}O_5$ and $HC_2H_3O_2$. On pouring the solution into a large volume of water elateridin is precipitated as a white flocculent mass. When elaterin is heated with dilute KOH, and the product is acidified with HCl, elaterinic acid $(C_{22}H_{32}O_6)_2 3H_2O$ is obtained as a brownish yellow amorphous powder.

Elemi, Manila. A. Vesterberg. (*Berichte*, **39,** 2467, *Schimmels' Report, October*, **1906,** 29.) In addition to amyrin (*Year-Book*, **1888,** 57) Vesterberg has isolated a secondary resin alcohol which is probably the brein of Baup. It is interesting as being the first di-valent alcohol resin known. Its formula is given provisionally as $C_{30}H_{27}(OH)_2$; m.p. 216–217°C. a_D in alcoholic solution + 65·5°. It gives a diacetyl derivative. (See also *Year-Books*, **1902,** 72; **1905,** 72.)

Emetine, Some New Reactions of, and Method of Determining. P. Bernardino. (*Boll. Chim. Pharm.*; *Répertoire* [3], **19,**

225.) With $KMnO_4$ in solution with H_2SO_4 emetine gives a peacock-blue solution evident with dilutions of 1 : 1,000. In solutions of HIO_3 in H_2SO_4 it gives an orange-red colour, passing to red-violet. With NaO_2 in H_2SO_4 a dull green colour is formed. With symmetrical diphenyl carbazide emetine gives a persistent rose colour, with an exterior violet red zone; sensible to 1 : 10,000. With tungstic acid in H_2SO_4 a deep green, with a shade of steel blue, is formed. With selenious acid a green colour is given, changing to violet on dilution with water.

To determine the alkaloidal value of ipecacuanha, 10 Gms. of the powdered root is mixed with 10 c.c. of water and 8 Gm. of Ca2(OH). The mixture is dried at 100°C., then extracted with $CHCl_3$. The $CHCl_3$ solution is filtered, concentrated and treated with a known volume, in excess of N/10 HCl; the free acid is then titrated back with N/10 NaOH. The equivalent 248 is taken for "emetine."

Emodin, Microchemical Detection of, in Drugs. W. Mitlacher. (*Pharm. Zeit.*, **57,** 1084.) A small quantity of the dry powdered drug in a watch glass covered with a large micro-slide is slowly heated on a sand-bath. If oxymethyl-anthraquinones be present, a crystalline sublimate composed of yellow birefringent needles about 1 mm. long will be obtained. Alcoholic KOH dissolves these, giving a deep red solution; the same colour is developed more slowly with aqueous NaOH. The sublimate is easily obtained with buckthorn and cascara sagrada, rhubarb and senna. When definite crystals are not formed, due to overheating, a good result may be obtained by resublimation; this second sublimation is often necessary with senna.

Enzymes, Employment of, as Reagents. E. Bourquelot. (*Journ. Pharm. Chim.* [6], **24,** 165; **25,** 16, 378; *Archiv. Pharm.*, **245,** 164, 172.) OXYDASES.—Although oxydases are widespread in plants, only two sources are available for the preparation of a reagent of these ferments; these are gum acacia, and the fungus *Russula delica*. For general use the latter is to be preferred. The aqueous triturate of the fresh plant, preserved with chloroform water, may be employed, but it is not very permanent. A more satisfactory preparation is the glycerin extract obtained by reducing the fungus to a paste, rubbing down with three times its weight of glycerin, macerating for one hour and filtering. The clear yellow liquid thus obtained retains its activity for a year at

least. Since gum acacia retains its oxydase for years, it is evidently a good preservative for the enzyme. A dry permanent preparation of *Russula* oxydase may be thus obtained. Mucilage of acacia is heated to boiling so as to destroy its specific oxydase. Slices of fresh *Russula delica* are moistened with a few c.c of ether in a separator; the ether (and chloroform as well) causes the juice to exude: this is collected and mixed with the sterilized mucilage. The mixture is spread on plates and dried at 30–40°C. The brown scales thus obtained are powdered, and the product retains the oxydase of the fungus in an active form.

This *Russula* juice and its preparations have a powerful oxidizing action on a large number of phenols and their derivatives. The reaction is evident in alcoholic as well as aqueous media, since the action of the oxydase is not arrested by ethyl or methyl alcohol up to the proportion of 50 per cent. by volume. Phenolic bodies which are insoluble in water, but soluble in these alcohols, may therefore be examined. To 10 c.c. of a very dilute solution of the product a few drops of the glycerin *Russula* extract are added, the mixture shaken and set aside. A characteristic change of colour or formation of a precipitate will occur more or less rapidly. Sometimes, in the case of phenols, the addition of a little sodium carbonate, or in the case of aromatic amines the presence of a little acetic acid, will hasten the reaction.

Phenol in aqueous solution, rendered faintly alkaline with Na_2CO_3 gives a red colour passing to black. *Orthocresol* gives a dirty brown precipitate, *metacresol* a pinkish white precipitate, and *paracresol* a black coloration. *Thymol* and *carvacrol* both give white precipitates; *a-naphthol* gives a violet colour, passing to dull blue, *β-naphthol* a white precipitate, soon turning yellow. *Guaiacol and acetyl guaiacol* give, at first, an orange red colour, then a bright red precipitate; *cresol* a fugitive green colour, passing to dull red; *eugenol* a pinkish white precipitate; *vanillin* a white crystalline precipitate. *Methylaniline* gives a yellow colour, which passes from green to violet; *a-naphthylamine* in dilute alcoholic solution made slightly acid with acetic acid forms a reddish violet precipitate; *veratrylamine* a deep violet colour; and *morphine* a white crystalline precipitate. The morphine precipitate has been shown by Bougault (*Year-Book*, **1902**, 112) to be oxymorphine, and that of vanillin by Lerat to be dehydrovanillin (*Year-Book*, **1904**, 353).

The enzyme of *Russula* and other fungi has one property that is not possessed by gum acacia or laccase; it is that of blackening

tyrosine, so that it forms a very delicate reagent for that substance. In fact Bertrand (*Year-Book*, **1896,** 63; **1897,** 77) considers that there are two ferments present in the juice of *Russula* and other fungi; one identical with that of Japanese lac, laccase, and the other specific which has been named tyrosinase, on account of its action on tyrosine. By means of this the presence of tyrosine has been demonstrated in *Russula adusta*, *R. nigricans*, *Bolelus aurantiacus*, *B. scaber* and *R. tesselatus*, also in the green pods of the broad bean; in animal products such as peptones and cheese. Harlay has made use of it to distinguish pancreatic peptone, which contains tyrosine, from peptic peptone which does not. The application of the oxidizing ferments to industrial purposes for dyeing has suggested itself; but although they are found to be active in this respect, they present no great advantage over the chemical agents already employed for the purpose.

HYDRATASES.—*Invertin* is thus prepared from top, or bakers' yeast. The yeast is suspended in sterilized distilled water, drained, suspended at once in 8 times its weight of alcohol 95 per cent., and left for 12 to 15 hours. It is again drained on a Buchner filter, washed with alcohol 95 per cent., then with a little ether, and finally dried at 30 to 35°C. The dried product will keep well, if protected from moisture. It is important that only fresh yeast be used; air-dried yeast is quite unsuitable. For use 1 Gm. of the dry yeast prepared as above is triturated with 100 c.c. of thymolized water and filtered. The invertin solution thus prepared will keep for a week; either this solution or the dried powder alone may be used.

Detection of Sucrose.—The first step is to destroy all the enzymes present in the fresh plant tissue. This is done by slicing the weighed material, of which 250 Gm. is a convenient quantity to use, over a flask containing boiling alcohol 90 to 95 per cent., in such a manner that the pieces fall at once into the alcohol without stopping the boiling; when all has been cut up, the flask is attached to an upright condenser and the whole is boiled for 20 minutes; by this all ferments naturally present are destroyed. A small quantity of $CaCO_3$ is added, and the alcohol is distilled off on the water-bath. The residue is then taken up in thymolized water and made up with that solvent, so that each c.c. equals 1 Gm. of the original material; thus when 250 Gm. is taken, the volume will be 250 c.c. This is divided into two parts, one (A) of 50 c.c. to serve as control, the other (B) 200 c.c. to

be inverted. To (B) 1 Gm. of powdered invertin is added, and both solutions in suitable flasks are maintained at 25–30°C. for varying periods : the first test is made in 2 days. Twenty c.c. is withdrawn from each flask, treated with 4 c.c. of basic lead acetate solution, filtered and examined polarimetrically in a 200 mm. tube. The difference in the rotation of the two liquids gives the amount of deviation due to inverted sucrose. Tests are made daily from (B) until inversion is completed, when a final comparative reading is made. If desired, the amount of invert sugar produced may be determined chemically in the usual manner. Operating in this manner the presence of cane sugar has been found by the author to be universal in plants containing chlorophyll. Of all the plants examined negative results were obtained only with 2 species of cryptogams, *Fucus serratus* and *Selaginella denticulata*. These conclusions have been borne out by other investigators who have found either sucrose, or a body which is hydrolized by invertin to be present. Sucrose is therefore a necessary principle in the economy of the plant, but since it is not itself assimilable it is accompanied in the plant tissues by the hydratase invertin. (See also *Year-Book*, **1902**, 87.)

Trehalase.—This ferment is found in *Aspergillus niger*, the common mould, as well as in most fungi. (*Year-Book*, **1905**, 163.) It has not yet been isolated as a pure ferment ; as usually employed it contains, beside pure trehalase, more or less invertin, emulsin and amylase. Consequently the presence of trehalose in any substance examined can only be assumed when the observed optical deviation, after treatment with trehalase, agrees with the theoretical figure. Trehalase as employed practically is merely the thallus of *Aspergillus niger*, grown in Raulin's medium, transferred for a while to distilled water, crushed, washed with alcohol, drained, and dried at 33°C. It is employed in the same manner as invertin. By its means the presence of trehalose is shown to be general in the fungi, which contain no sucrose.

Emulsin is one of the most important ferments for laboratory use, since the presence of many glucosides is demonstrated by its means. It is thus prepared :—One hundred Gm. of sweet almonds are blanched and beaten to a paste in a mortar. The product is macerated in a mixture of 200 c.c. of water and chloroform water, for about 24 hours ; the liquid is strained with expression ; the product is treated with 10 drops of glacial acetic acid to coagulate the casein, which is removed by filtration. The clear filtrate is

treated with 500 c.c. of 95 per cent. alcohol, which precipitates the ferment; this is collected, drained, washed with a mixture of equal volumes of ether and alcohol and dried *in vacuo* over H_2SO_4. The horny scales thus obtained are rubbed to powder. Emulsin thus obtained keeps well if protected from moisture.

To detect glucoside in fresh material, this must be sliced into boiling alcohol as described above under invertin, for those plants which contain a glucoside usually also contain a ferment which hydrolizes it. The alcoholic solution is then treated as previously described. The product is then first hydrolized with invertin, and the amount of optical deviation due to the inversion of the sucrose determined. The solution which has been thus hydrolized is taken to 100°C. to kill the invertin, then cooled and treated with emulsin, when a further optical rotation will indicate the presence of a glucoside which is hydrolized by emulsin. By this means the presence of one or more glucosides has been proved in the following material.

FRESH SUBTERRANEAN ORGANS.—Roots of *Aucuba japonica*, *Digitalis purpurea*, *Dipsacus pilosus*, *Jasminium nudiflorum*, *Valeriana officinalis*, *Verbascum thapsus*; bulbs of *Colchicum autumnale*; tubercles of *Loroglossum hircinum*; rhizome of *Scrophularia nodosa*.

FRESH BARKS.—*Betula alba*, *Fraxinus excelsior*, *Ligustrum lucidum*, *L. spicatum*, *L. vulgare*, *Syringa vulgaris*, *Sambucus nigra*.

DRIED SEEDS.—*Aucuba japonica*, *Hibiscus esculentus*, *Strychnos bakanko*, *S. ignatia*, *S. nux vomica*, *S. potatorum*.

LEAVES.—*Diervilla japonica*, *Lonicera periclymenum*, *Sambucus ebulus*, *S. laciniata*, *S. pyramidalis*, *S. nigra*, *S. racemosa*, *Symphoricarpus racemosa*, *Viburnum lantana*, *V. opulus*, *V. tinus*, *Jasminum nudiflorum*, *Ligustrum japonicum*, *L. lucidum*, *L. spicatum*, *L. vulgare*, *Syringa persica*, *S. vulgaris*, *Anemone nemorosa*, *A. pulsatilla*, *Aquilegia vulgaris*, *Delphinium elatum*, *Ficaria ranunculoides*, *Helleborus fetidus*, *Ranunculus bulbosus*, *R. repens*, *Taxus baccata*, *Cephalotaxus drupacea*, *C. pedunculata*, *Podocarpus sinensis*, *Torreya myristica*, *Juniperus sabina*, *J. virginiana*.

From this it will be seen that glucosides are more frequently met with in the organs of assimilation than in those which store reserve material; often the leaves contain glucosides but the roots none. It is pretty evident that glucosides are formed in the leaves, and that they play an important part in the intra-

cellular chemical reactions. By means of the emulsin reaction not only may the presence be detected, but indications of one or more glucosides may be obtained, and if only one be present, its amount may be determined quantitatively by observing the degree of optical deviation caused by its hydrolysis.

Enzymes, Presence of, in Terrestrial Molluscs. — Bierry and — Giaja. (*Soc. Biolog. Journ. Pharm. Chim.* [6], **25,** 86.) Snails and terrestrial molluscs are found to possess very active enzymes, an emuslin and a lactase. The secretion of the hepatopancreas of *Helix pomatia* hydrolizes saccharose, maltose and raffinose.

Ergot Alkaloids. G. Barger and F. H. Carr. (*Pharm. Journ.* [4], **23,** 257; *Brit. Assoc.*). The crystalline alkaloid ergotinine was obtained from ergot by Tanret more than 30 years ago, the formula, $C_{35}H_{40}O_6N_4$, being then assigned to it.

Tanret's figures for the percentage of carbon and of hydrogen in ergotinine (roughly C=68·5 per cent., H=6·5 per cent.) are confirmed, but nearly 3 per cent. more nitrogen is found by Dumas' method (11·7 instead of 9 per cent.).

Molecular weight determination in phenol solution by the cryoscopic method gave the values 477 and 516; in pyridine solution the value 463 was obtained, employing a microscopic vapour pressure method.

Without as yet definitely assigning a formula to ergotinine it is suggested that the alkaloid probably has the composition $C_{27}H_{32}O_4N_4=488$.

It will be seen that the ergotinine molecule is not more complex than that of several well-known alkaloids, and that it is smaller than Tanret imagined. It is unique among alkaloids in having four nitrogen atoms. It apparently contains no phenolic hydroxyl and no methoxyl group. It is probable that there is a methyl group attached to one of the nitrogen atoms. In methyl iodide solution a gelatinous methiodide is formed, and when one molecular proportion of bromine is added in chloroform solution, a hydrobromide, probably of monobrom-ergotinine, separates out.

From the ethereal mother-liquors of crystalline ergotinine Tanret obtained another non-crystalline alkaloid, which he termed amorphous ergotinine. A similar resinous substance of

alkaloidal nature and great physiological activity was described by Kobert as cornutine.

This has now been obtained in a state of chemical purity, and for it the name "*ergotoxine*" is suggested. Though itself amorphous it forms a number of crystalline salts. The oxalate crystallizes from alcohol in minute prisms, mostly arranged in rosettes; the tartrate forms prisms; the phosphate fine needles, frequently grouped in sphaerites.

Unlike ergotinine, "ergotoxine" readily dissolves in aqueous caustic soda and gives a benzoyl derivative by the Schotten-Baumann method; it probably contains a phenolic hydroxyl.

The analytical data so far obtained point to a formula differing but slightly from that of ergotinine. Both alkaloids give strongly fluorescent solutions, and give with sulphuric acid and ferric chloride the play of colours originally described by Keller as characteristic of ergotinine.

According to the physiological experiments of H. H. Dale, ergotoxine produces in doses of a few milligrams all the typical effects of ergot described in a recent paper (*Journ. of Physiology*, 1906, xxxiv., 163). There seems little doubt that it is the most important, if not the one essential active principle, whereas pure crystalline ergotinine is almost or quite physiologically inactive.

(See also p. 62.)

Ergot, Determination of, in Flour. R. Bernhardt. (*Zeits. Untersuch. Nahr. and Genuosmit.; Répertoire* [3], **19,** 271.) One hundred Gm. of the flour is hydrolized by boiling with 1 c.c. of HCl in 500 c.c. of water until it ceases to react with iodine. It is then allowed to deposit and the insoluble matter is collected on a filter, dried and weighed. The residue is washed with CCl_4 to remove fat. It is then removed from the filter and treated with strong ammoniacal $CuSO_4$ to dissolve the cellulose; 10 times its volume of water is then added, and the insoluble matter is collected, dried and weighed. A control experiment is conducted with 100 Gm. of pure flour free from ergot. The difference in the final weights of the two insoluble residues $\times$ 8·333 gives the percentage of ergot present.

If the flour contains the seeds of corncockle as well as ergot, 100 Gm. are boiled with 5 per cent. HCl solution for 2 hours; the insoluble residue is then boiled for an hour with 3 per cent. NuOH solution; the insoluble matter is dissolved in strong HCl and the solution is diluted with 5 times its volume of ice-

cold water. After standing for several days in a cold place the white precipitate which is formed is collected on an asbestos filter, dried and weighed. The weight of the precipitate × 43·38 gives the weight of ergot in the flour taken.

Ergotinine. C. Tanret. (*Journ. Pharm. Chim.* [6], **24**, 397.) In view of the statement of Barger and Carr (p. 60) that the formula of crystalline ergotinine may be $C_{28}H_{32}N_4O_4$ instead of $C_{35}H_{40}N_4O_6$, as previously found by the author, the latter has reinvestigated the matter. The nitrogen in his original combustions having been determined by the Will and Varrentrap method, which is admitted to have given too low results, a fresh determination by Dumas' method has confirmed the results of Barger and Carr. But while admitting the correctness of this, the author traverses the correctness of the molecular weight determination by the cryoscopic method described by Barger and Carr, since in this they have employed phenol or pyridine as solvents; phenol is stated to give fallacious results, since it is not absolutely inactive towards ergotinine as shown by the altered optical activity; a phenate of ergotine is in fact formed. Consequently the molecular weight 463 found by this method is wrong. Pyridine having given similar results, also leads to an erroneous influence. Tanret therefore gives $C_{35}H_{40}N_5O_5$ as the correct formula for ergotinine; this is his original formula, with one atom more nitrogen and one atom less oxygen. This formula, with the molecular weight 610, is confirmed by the analysis of hydrochloride, hydrobromide, and the platinochloride.

Tanret also takes exception to the application of the name ergotoxine to the amorphous body accompanying crystalline ergotinine, which he discovered and named amorphous ergotinine, and which in a resinified condition was called cornutine by Kobert. The mere statement by Barger and Carr that they have obtained this amorphous body in a state of purity does not warrant the change in nomenclature. The statement that amorphous ergotinine is insoluble in caustic alkalies is not correct. The author has previously shown that both crystalline and amorphous ergotinine are soluble in dilute NaOH solution; they are precipitated by caustic alkalies and dissolved by an excess. The statement as to the fluorescence of the two bases, reiterated by Barger and Carr, was also anticipated by Tanret, who showed that this was marked in a solution of 1 : 50,000.

The statement that their ergotoxine, or amorphous ergotoxine,

may be the most important, if not the only active principle of ergot, and that crystalline ergotinine is almost physiologically inert is strongly controverted, the author relying on the constant therapeutic employment of the crystalline base to refute this. (See *Comptes rend.*, Nov. 1875; *ibid.* April, 1878; *Annales Chim. Phys.* [5], **17**, 493–502; *Year-Books*, **1876**, 98; **1877**, 20; **1878**, 23; **1881**, 221; **1885**, 193; **1889**, 65; **1895**, 151.)

Eriodictyon, Chemistry of. F. B. Power and F. Tutin. (*Proc. Amer. Pharm. Assoc.*, **54**, 302.) The leaves of *Eriodictyon californicum* were found to contain no alkaloid. Extracted by successive solvents they gave 2 02 per cent of extract to petroleum ether; 18·26 per cent. to ether; 1·38 per cent. to chloroform; 2 04 per cent. to acetic ether, and 3·72 per cent. to alcohol. The petroleum ether extract was a fatty solid; the ether and chloroform and acetic ether extracts were resinoid, and the alcohol extract was a dark brown syrupy liquid. The aqueous extract of the marc of this treatment contained only a little tannin, gum and colouring matter. The direct alcoholic extract of the drug yielded a small amount of essential oil having the characteristic odour of the drug; the aqueous distillated also contained formic and acetic acids. After removing this the aqueous portion was found to contain three bodies of a phenolic nature: eriodictyol $C_{15}H_{12}O_6$, m.p. 267°C.; homo-eriodictyol, $C_{16}H_{14}O_6$, m.p. 223°C.; and a yellow body, $C_{16}H_{12}O_6$. Eriodictyol forms small fawn-coloured plates when recrystallized from glacial acetic acid. It is sparingly soluble in water, but dissolves in alkaline solutions. It does not reduce Fehling's solution; it is not precipitated by $Pb2C_2H_3O_2$, but gives a copious yellow precipitate with basic lead acetate. It gives a deep greenish brown colour with Fe_2Cl_6 changing to brown. Homo-eriodictyol is somewhat soluble in boiling water, from which it crystallizes in lustrous foliaceous crystals. It is more insoluble in cold water than eriodictyol: it is not precipitated by either basic or neutral lead acetate. The statement of Thal that the drug contains ericolin was not confirmed. Eriodictyonic acid found by Quirini was probably an impure homo-eriodictyol. In addition to these constituents triacontane, pentriacontane, free cerotic acids, some glycerides of fatty acids, a phytosterol, much resinoid matter and some glucose were isolated.

Eriodictyon glutinosum, Chemical Constituents of. G. Mosseler. (*Apoth. Zeit.*, **22**, 170; *Liebig's Annal.*, 1907

[351], 233.) Petroleum ether removes fatty matter consisting of the glyceride of an unsaturated fatty acid, $C_{15}H_{28}O_2$; a small quantity of a saturated fatty acid is also present, and a paraffin in the unsaponifiable portion. After treatment with petroleum ether, ether removes crystalline yellow body $C_{16}H_{14}O_6$, m.p. 214–215°C., which has been named eriodictionone. It contains 1 methoxyl and 4 hydroxyl groups, so that the formula may be written $C_{15}H_7O(OCH_3)(OH)_4$. By the action of Br. it forms $C_{16}H_{14}O_6Br_4$, which is also an unsaturated body. A tannin, sugar and gum are the other constituents of the drug. (See also *Year-Books*, **1888,** 153; **1891,** 180.)

Essential Oils, Indian. D. Hooper. (*Chem. and Drugg.*, **70,** 207.) *East Indian geranium or palma rosa* oil, known in the vernacular as "rusa-ka-tel," is obtained from *Cymbopogon martini*, or rusa grass, which occurs abundantly in the North East of the Bombay Presidency, in Malwa, Meswara, and Rajputana in Central India, in the Central Provinces and in Berar. The original seat of the oil-distilling industry appears to have been at Pimpalnur, but the manufacture has spread to Mandubar, Shahada and Toloda. The Mimar district in the Central Provinces has always been an important centre and the oil was known commercially for many years as "Nimar oil." The plant commences to flower at the end of August and continues to bloom vigorously to October or November, during which period it furnishes sufficient oil to render distillation remunerative. The same primitive methods of water-distillation are employed today as were used 80 years ago. The grass is boiled in iron stills over an open fire. From the still-head two copper tubes conduct the steam into two copper receivers immersed in cold water. The process lasts for 6 hours, the output being a seer of oil for 4 charges in 24 hours. One such still will produce about half a maund or 20 gallons of oil in a season. Two kinds of rusa grass oil are produced in the Central Provinces, one with a fine delicate aroma and a yellow colour called "motia"; the other darker and more pungent, named "sophia."

Lemongrass Oil is derived from *Cymbopogon flexuosus*. Although allied to rusa-grass oil in its botanical origin, it is totally distinct in its chemical composition. It is prepared in Southern India, and the industry is more modern than that of rusa oil; no earlier record than its importation into England in 1832 can be traced. For many years it has been prepared on the western

slopes of Travancore, north of Anjengo, as far as Cochin, where the grass can be obtained sufficiently green and fresh for about six months in the year. In this region the Malayalis distil the grass in copper stills with an earthen dome, and a condenser consisting of a copper tube passing through a tall wooden bucket. Each boiling yields a quart of oil. In the eastern part of the Travancore State the Tamils use a round copper boiler contracted into a neck at the top, and about 4 ft. high. The top is covered with a specially prepared earthen vessel which communicates with a copper tube about 3 in. in diameter which passes through a condenser filled with cold water to a receiving vessel. When the still is charged with grass, all the joints are made airtight by luting with rags and clay. Distillation is continued for 24 hours, when about a pint of oil is obtained. The stills are moved about from place to place according to the abundance of the grass, and in the cold weather may be seen dotted over the landscape. In February the grass becomes coarse and is burnt. The industry and the profits were formerly in the hands of natives, and operations were carried on with grass growing wild in the jungles. Gradually the wild grass of the two States of Travancore and Cochin became insufficient to supply the increasing demand for the oil from Europe. The distillers of Cochin then began to exploit Malabar, where the grass was not known to have any economic value. The owners of the land, on account of the new use of the grass, enjoyed the benefit of seeing the oil rise to fourteen times its former value. Planters have commenced distillation in the Ernad and Waluvanad taluqs, in the Wynaad, and Venieri in Pudupati. These hilly regions are covered entirely with lemongrass, which is sold at a nominal sum, but the question of specially cultivating the grass for oil in suitable lands is now being considered. It has been said that the new industry will provide an outlet for the energies of the Moplahs, whose fanaticism is so well known and perhaps may be traced to the straitened circumstances of their existence. In 1903 there were eleven stills at work at Waluvanad, most of them being controlled by Moplahs. The stills used are more modern in construction than those used in the south. The copper boiler is 6 ft. high and 12 ft. in circumference, From the head of the still a pipe conducts the steam through a condensing tub filled with cold water, and the oil is collected into the vessels used as receivers. The best oil, before it is bottled, is always filtered through paper. When Travancore held the monopoly of the

F

industry, the oil was exported from Cochin, but now that the industry has extended northwards into Malabar, Calicut is becoming a centre of distribution.

Lemongrass oil is exported in reputed quart bottles, each of which is guaranteed to contain 23 oz. One dozen of these bottles make a case. The exports from Cochin have risen from 228 cases in 1884 to 2,387 cases in 1889 and 1,917 cases in 1890. At the present time from 2,000 to 3,000 cases are exported annually from Cochin to Bombay and to various foreign ports, chiefly New York, Hamburg and London.

Sandalwood Oil.—Sandalwood is mainly derived from the province of Mysore, where the trees are protected by the State, and brings in an annual revenue of five or six lakhs of rupees. The wood is purchased by Mohammedans in Bombay, whose agents attend the Mysore auctions, and is shipped to Europe *viâ* Tellicherry or Bombay. The Mysore Government has long had establishments for extracting the oil, which is sent to China and Arabia. The oil is procured from the wood by distillation, the roots yielding the largest quantity and finest quality. The yield of the oil is at the rate of 10 oz. per maund, or 2·5 per cent., and the process lasts several days. The average price of the oil in India is Rs. 8 per lb. Two or three private firms have also established stills, but the oil is said not to compare in properties with that made by European distillers.

Turpentine Oil, from the oleo-resin of the Chil pine (*Pinus longifolia*), is prepared by the Forest Department in Northern India. Factories are established at Dehra Dun, Naini Tal, and Nurpur in Kangra. These centres are capable of producing about 20,000 gallons of turpentine oil a year. The whole of this output is consumed in the country, being used in the Medical Stores, Military Department, by several railway companies, and by paint and varnish manufacturers.

Eucalyptus or Blue-gum Oil is now an established industry on the Nilgiri Hills. The blue-gum plantations were commenced about 60 years ago, and the wood has been used frequently as fuel. About 20 years ago the oil was first distilled from the leaves in the Botanical Gardens, Ootacamund. At the time of the influenza epidemic in 1891, the manufacture was taken up by Mr. Wallace, and the oil was readily bought locally and by the Medical Stores depôt in Madras. Lately other stills have been erected at Lovedale and Coonoor, and the produce finds an appreciative market.

Indigenous Perfumes are often asked for by English and Continental dealers. Among these are :—

Essence of Champaca, or Champa, from the flowers of *Michelia champaca*. The blossoms must be gathered singly just as they expand, and must be distilled at once or submitted to the process of enfleurage.

Keora Essence is also much sought after by European distillers. The flowers have a most delicate scent. Samples of oil placed on the market are usually obtained by steeping the blossoms in sesame oil, which destroys all the honey-like characters of the true odour.

Cassia Flowers, obtained from *Acacia farnesiana*, yield an excellent perfume for which there is always a demand. About 15 years ago a large consignment of Indian-made cassia pomade was shipped to London, and was found to be superior to that grown at Grasse in France.

Patchouli Oil.—There are various species of *Pogostemon* in Western India, which are marked by their strong perfume, and would doubtless yield essential oils.

Ether, Removal of Alcohol from, by Means of Colophony. P. Guigues. (*Journ. Pharm. Chim.* [6], **24**, 204.) Distillation over colophony is found to be an effective method of removing small quantities of alcohol from ether, and is more economical than frequent washing with water, on account of the solubility of ether in that fluid. Ether containing 5 per cent. of alcohol is washed once with water; the aqueous portion is separated, and 50 Gm. of colophony is then added to each litre of ether which is distilled. The entire distillate has the sp. gr. 0·720, and is therefore free from alcohol. This method is only applicable to the removal of alcohol and does not replace the ordinary methods of purification necessary with impure ether.

Ethyl Citrate as an Adulterant of Essential Oils. C. T. Bennett. (*Chem. and Drugg.*, **69**, 691.) A specimen of an ester used as an adulterant of essential oils has proved to be ethyl citrate. Sp. gr., 1·146; optically inactive; b.p., 285–295°C.; $\eta_D 1{\cdot}4400$; saponification value, 610. The high saponification value renders this body extremely useful to the scientific adulterator, for the addition of such a small amount as will scarcely affect the physical constants of an inferior oil will very materially raise the "ester value," since its equivalent is more

than twice that of most esters naturally present in essential oils. Its addition to oils of lavender and bergamot in small proportions can only be detected by chemical tests. (See also p. 91.)

Eucalyptus carnea, Essential Oil of. R. T. Baker. (*Proc. Linn. Soc. N.S.W.*, 1906, [2], 303; *Schimmels' Report, April,* **1907,** 52.) This new species of eucalyptus gives 0·155 per cent. of oil consisting chiefly of dextro-pinene; it has only 5 per cent. of cineol, no phellandrene, and an ester which is being investigated.

Eucalyptus thozetiana, Essential Oil of. R. T. Baker. (*Proc. Linn. Soc., N.S.W.*, 1906, [2], 303; *Schimmels' Report, April,* **1907,** 52.) The yield of oil is very small; it is red in colour; sp. gr., 0·9257 at 16°C.; $\eta_{D16°}$ 1·5026. It probably consists chiefly of esters.

Eupatorium triplinerve, Essential Oil of. (*Schimmels' Report, April,* **1907,** 106.) The oil distilled in the Comoro Islands and known as Ayapana oil, has a peculiar odour; sp. gr., 0·9808; a_D + 3° 10′; ester value, 8·0; acetyl value, 23·4; solubility in 90 per cent. alcohol, 2 : 3; insoluble in alcohol 80 per cent. Except for traces of terpenes the oil consists chiefly of a single body, b.p. 104 to 105°C. under 3·5 mm.

Evodia simplex, Essential Oil of. (*Schimmels' Report, October,* **1906,** 82.) This Rutaceous plant, a native of Réunion, yields a yellowish-green oil with a pleasant odour; the smell of geranium oil which was noticeable, was attributed to the distillation having been performed in geranium-tainted stills. It had the following characters:—Sp. gr., 0·9737 at 15°C.; a_D —13° 4′; acid value, 2·1; ester value, 16·4; acetyl value, 63·3. Soluble in alcohol 80 per cent. 10 : 9 with separation of paraffin. Not completely soluble in alcohol 70 per cent. It deposits crystalline scales on cooling, but does not solidify. Eugenol methyl ester was found among its constituents together with a paraffin, m.p. 80–81°C.

Filicotannic Acid. W. Wollenweber. (*Archiv. Pharm.*, **344,** 466, 481.) This acid, $C_{41}H_{44}NO_{22}+2H_2O$, is obtained by evaporating the alcoholic extract of male fern rhizome at the normal temperature under reduced pressure in dry air; the residue thus obtained is extracted with cold ether; the insoluble residue is further extracted with boiling ether in a Soxhlet's

tube, the insoluble slightly coloured residue treated with water, filtered and evaporated to dryness on the water-bath is filicotannic acid. The yield is about 7·8 per cent. It is soluble in all proportions in water, the solution is optically inactive. Very soluble in alcohol, it is only sparingly dissolved by acetone, insoluble in ether, $CHCl_3$, CS_2, or C_6H_6. A piece of deal moistened with the aqueous solution is gradually reddened by vapours of HCl. The aqueous solution is precipitated by acids; Fe_2Cl_6 gives a green colour, turning brown; Ba2OH, a blue tint, becoming bright red; towards gelatin, albumin, and alkaloids filicotannic acid behaves like tannin. It reduces Fehling's solution on boiling. At 100°C. it parts with 2 mols. H_2O; at 125°C. it loses another 4 mols., giving the anhydride $C_{41}H_{36}NO_{18}$, which Reich has previously described as filicotannic acid. At 148°C. another 2 mols. of H_2O are parted with, the anhydride $C_{41}H_{32}NO_{16}$ formed being insoluble in water.

Formaldehyde and other Aldehydes, New Reagent for. E. Feder. (*Archiv. der Pharm.*, **245,** 25). $HgCl_2$ 20 Gm. is dissolved in 1,000 c.c. of water. Separately, Na_2SO_3 100 Gm.; NaOH 80 Gm., are dissolved in another 1,000 c.c. of water. An equal volume of the latter is added to the former to obtain the reagent which is clear, colourless, and stable. Ten c.c. of the reagent is added to the first 5 or 10 c.c. of the aqueous distillate from any substance to be tested. In the presence of 0·2 Mgm. of formaldehyde a marked reduction is obtained in a few seconds; with 0·05 it is evident in 1 or 2 minutes.

Formaldehyde, Presence of, in Caramel. A. Trillat. (*Bull. Soc. Chim.*, **35,** 681.) It has previously been shown (*Year-Book,* **1904,** 91) that formaldehyde is present in notable quantities in the combustion products of most organic bodies containing carbon. It is now found that considerable quantities of formaldehyde are given off during the caramelization of sugar, and further that a considerable amount is left in the resulting caramel. Traces are formed at 125°C.; at 150°C. every 100 Gm. of caramel formed contains 0·090 Gm. of formaldehyde, and 0·3 Gm. is evolved. Between 150–180°C., 0·135 Gm. remains, and 1·10 is given off; between 180–200°C., the resulting caramel yields 0·27 per cent. and 2·2 per cent. is given off. Out of 5 samples of commercial caramel examined. 3 contained distinct traces of formaldehyde. The presence of this

antiseptic retards the fermentation of the sugar present in caramel, and accounts for the antiseptic properties which that colouring is known to possess. In view of the extended use of caramel as a colouring agent for foods, the fact that it contains formaldehyde should be noted, since traces of that body may be detected in articles coloured therewith; as the addition of formaldehyde as a preservative is forbidden in some countries a wrong inference might be deduced. The quantity of formaldehyde thus introduced is so small that it is quite harmless.

Fruit Juices, Summary of, Examination of, in 1906. (*Zeits. Untersuch. Nahr. Genussm.*, **12,** 721; *Analyst*, **32,** 50.) The following are the summarized figures of 11 analysts recorded for the fruit juices during the year 1906.

Kind of Fruit		Total Solids Gm. per 100 c.c.	Ash Gm. per 100 c.c.	Alkalinity of Ash c.c. N/acid per 100 c.c.
Raspberry,	59 samples	4 18	0 52	5 85
Currant,	27 ,,	4 69	0 56	5·13
Cherry,	18 ,,	14 42	0 57	6 39
Bilberry,	11 ,,	6 02	0 29	3 22
Blackberry,	10 ,,	3 58	0 51	6 50
Strawberry,	7 ,,	5 42	0 44	5 46
Gooseberry,	6 ,,	3 38	0 37	4·33
Lemon,	6 ,,	9 25	0 36	4 23

Gass-tenga, an Indian Food Product from Dendrocalamus hamiltonii. D. Hooper. (*Pharm. Journ.* [4], **23,** 259.) An acid food-product eaten with rice and prepared in Upper Assam, is known as "Gass-tenga." Three samples of this interesting substance were examined. It is made from the young shoots of the bamboo, *Dendrocalamus hamiltonii*, by a process of fermentation, and afterwards dried in the sun. The acid principle is in colourless crystals, and similar to aspartic acid. Three different samples of gass-tenga afforded 2·3, 4·5, and 1·1 per cent. of this organic acid, the difference probably being due to the time consumed in the fermentation or to some modification of the process. The acid appears to be derived from the asparagin of the growing shoots of the bamboo.

Gelatin, Precipitation of, by Nessler's Reagent. — Vamvakas. (*Annales de Chim. Analyt.*, **12,** 59.) When Nessler's reagent is shaken with a solution of gelatin, sp. gr. 1 032, a

turbid lead-grey emulsion is formed, which ultimately subsides to a precipitate. On heating, the reaction takes place at once. If before boiling, solution of tartaric acid be added in equal quantity to the Nessler's reagent, the same reaction occurs, but it is not given by gum acacia, cane sugar, glucose, saponaria, or licorice. Dextrin gives an immediate bright yellow colour, without agitation, and a dull grey precipitate on boiling. The gelatin solution diluted 1 : 10, gives the same reaction as the stronger one, but the grey precipitate is duller. The presence of gelatin in commercial adhesive "gums" is readily detected by this method.

Gastric Secretion, New Reaction for Free HCl. in. F. Simon. (*Apoth. Zeit.*, **21**, 38.) A small quantity of dry unoxidized guaiacum resin is dissolved in a mixture of spirit of nitrous ether 1, alcohol 90 per cent. 4. A few c.c. of this freshly prepared solution are floated on 5 c.c. of the gastric secretion in a test-tube. In the presence of free HCl a bluish-green zone is soon evident, which will appear more rapidly on gently warming. The amount of free lactic acid which is present in gastric juice is not sufficient to interfere with the reaction.

Gelsemium, Comparative Alkaloidal Strength of Fresh and Dried Rhizome. L. E. Sayre. (*Proc. Amer. Pharm. Assoc.*, **1906,** 383.) Last year (*Year-Book*, **1906,** 35) the fresh root preserved in alcohol was compared with the dry drug. This year, fresh root in a natural condition was used, and the amount of alkaloids found to be 0·346 per cent., using the same (Blythe's) method of extraction as formerly. By the U.S.P. official method for the assay of hydrastis, 0·4725 per cent. was obtained.

Ginger-Grass and Palmarosa Grass, Essential Oils of. (*Schimmels' Report, April,* **1907,** 58.) Specimens of "sofia" and "motia" grasses from Central India, together with the oils distilled from them, sent by J. H. Buckill of the Indian Museum, Calcutta, have been examined.

"Motia" oil had the characters of palma rosa oil, sp. gr. 0·887 at 15° ; $a_D + 0° 55$; acid value, 1·0 ; ester value, 39·8 ; acetyl value, 256 ; solubility in alcohol 70 per cent., 10 : 16.

"Sofia" oil had the characters of ginger-grass oil : sp. gr., 0·9284 ; $a_D + 35°$; acid value, 1·3 ; ester value, 19·2 ; acetyl value, 175 ; solubility in 70 per cent. alcohol, 1 : 2, opalescent with more.

Glucose, New Method of Determining. — Glassman. (*Berichte*, **39**, 503.) A known volume of the glucose solution is treated while boiling with excess of Liebig-Knapp's reagent, which is thus prepared. $Hg(CN)_2$ 10 Gm. is dissolved in NaOH solution, sp. gr. 1·45 100 c.c., and made up to 1 litre with water. Or Sachse's reagent may be employed; this consists of HgI_2 1·8 Gm., KI 2·5 Gm.; KOH 8 Gm.; water to make 100 c.c. Glucose precipitates Hg quantitatively from either of these reagents, on boiling. The precipitate is washed and dissolved in HNO_3. The amount of Hg is then determined by Rupp and Krause's method. The volume of the solution of Hg is adjusted to 50 c.c.; 1 or 2 c.c. of saturated solution iron alum indicator is added, and the liquid is titrated with N/100 AmCNS solution, each c.c. of which = 0·001 Gm. of Hg, and 0·0003 Gm. of glucose.

Glycerin, Determination of, in Fluid Extracts. E. Weiss. (*Oester. Zeits. Pharm.*; *Journ. Pharm. Chim.* [6], **24**, 316.) Fifteen Gm. of the fluid extract is weighed off in a flask graduated to 150 c.c., diluted with 100 c.c. of water and precipitated with 15 c.c. of basic lead acetate solution. The mixture is warmed on the water-bath to aggregate the precipitate; when cold the volume is adjusted to 150 c.c. and filtered. One hundred c.c. of the filtrate is then treated with 30 c.c. of acid potassium mercuric iodide solution to remove alkaloids. This reagent is prepared by dissolving KI, 10 Gm., HgI_2, 10 Gm. in water 100 c.c., and adding to every 30 parts of this solution 1 part of HI, sp. gr. 1·91. The precipitate is filtered out, and 65 c.c. of the filtrate is treated with a current of SH_2 at 70°C. The liquid is then filtered, the precipitate washed, and the bulked filtrate evaporated to about 20 c.c. The small amount of sulphur thrown down is then filtered out, and the filtrate collected in a graduated 50 c.c. flask; the filter is washed with sufficient water to bring the volume to 50 c.c.; 5 c.c. of this is taken, corresponding to 0·5 Gm. of the original extract, and placed in Zeisels' methoxyl determination apparatus. Under the influence of the HI the glycerin will have been converted into propyl iodide. The iodine, which is liberated at the same time as the propyl iodide, is combined by means of sodium arsenite solution; the propyl iodide is then treated with silver nitrate solution when the whole of its iodine is converted into AgI. This is collected and weighed in the usual manner, and

from the amount found the equivalent of glycerin is calculated.

Glycocoll, Reaction for. G. Denigès (*Bull. Soc. Pharm. de Bordeaux ; Répertoire* [3], **18,** 533.) If 10 Gm. of benzamide is heated with 5 Gm. of glycocoll, the mixture at first reddens, then turns brown and gives off, at first, the odour of NH_3, then of benzoic acid, HCN, and finally of benzonitrile, the odour of which resembles that of coumarin. Hippuric acid when heated alone gives the same odours, so that probably that acid is formed from glycocoll, under the above conditions, with evolution of NH_3.

Glycyrrhizin. A. Tschirch and H. Cederberg. (*Archiv. der Pharm.*, **245,** 97.) Glycyrrhizin is a mixture of the calcium and potassium salts of glycyrrhizinic acid. It contains no ammonia and no nitrogen. When a concentrated aqueous extract of licorice is treated with 4 times its volume of alcohol, a gummy body is precipitated. On removing this by filtration and adding to the filtrate an equal volume of alcohol, a whitish precipitate is obtained. This is *glycyrrhizin.* When purified it is quite colourless, and is obtained in two crystalline forms by crystallizing from glacial acetic acid. The yield is about 3 per cent. The higher yield recorded by early investigators of 7·5 per cent. are due to the substance being contaminated with colouring matter and other impurities.

To isolate *glycyrrhizinic acid* an aqueous extract of Russian licorice root was treated with H_2SO_4 as long as a precipitate was obtained. This was collected and washed with water until the H_2SO_4 was removed, then pressed and dissolved in 3 times its weight of alcohol. After filtering, twice its volume more alcohol was added, which caused the precipitation of a mucilaginous substance containing nitrogen. The filtrate from this was evaporated to dryness, the dry residue again dissolved in alcohol and this solution treated with ether. This causes the precipitation of a dark-coloured, very bitter and acrid substance. After filtration from this the alcohol-ether solution gives on evaporation purified glycyrrhizinic acid, which, when powdered, is yellow and very sweet. It is soluble in weak alcohol, methyl alcohol, aqueous acetone and glacial acetic acid, less readily dissolved by absolute alcohol, and insoluble in ether and in chloroform. It could not be obtained crystalline directly by solvents, but it forms a monopotassic salt, which is crystalline.

This is converted into the lead salt, suspended in dilute alcohol, and decomposed with H_2S. After filtering off the PbS and evaporating to dryness, the residue, when dissolved in glacial acetic acid, crystallizes therefrom in scales, which recrystallized from alcohol, form colourless prisms, m.p. 205°C. after changing colour and sintering at 170°C. Glycyrrhizinic acid has the formula

$$C_{31}H_{45}O_3\begin{cases} OCH\ CH{\cdot}OH{\cdot}CH\ OHCHO{\cdot}CH{\cdot}OH\ COOH \\ COOH \\ OHC{\cdot}CH,OH{\cdot}CH{\cdot}OHCHO{\cdot}CH{\cdot}OH{\cdot}COOH \end{cases}$$

It is not a true glucoside although it has a glucosidal character When hydrolized with dilute H_2SO_4 it takes up 2 mols. H_2O, splitting up into glycyrrhetinic acid

$$C_{31}H_{45}O_3\begin{cases} OH \\ COOH \\ OH \end{cases}$$

and 2 mols. of glycuronic acid, $HOC{\cdot}(CHOH)_4C{\cdot}OOH$. Glycyrrhizinic acid is therefore the diaglucuronic acid ester of glycyrrhetinic acid. Glycyrrhizinic acid is optically inactive. As its formula indicates it is tribasic, and may be titrated with alkali, with phenolphthalein indicator. It does not reduce either ammoniacal, silver nitrate, or Fehling's reagents. It has a characteristic sweet taste free from acridity. Its monopotassium salt, $KC_{44}H_{63}O_{19}$, is crystalline and has an intensely sweet taste, recognizable in a dilution of 1 : 20,000. Its aqueous solutions gelatinize on standing, and are coloured yellow by addition of alkali. Although the monobasic alkali salts are crystalline, the neutral tribasic salts are amorphous white powders.

Glycyrrhetinic acid, obtained by the hydrolysis of glycyrrhizinic acid, is obtained by recrystallization from glacial acetic acid in colourless tasteless needles, m.p. about 210°C. It is the glycyretin of earlier authors. As its formula indicates, it forms a diacetyl as a white powder, m.p. 219°C. *Glycuronic acid* is isolated after filtering out the glycyrrhetinic acid by saturating the filtrate with $BaCO_3$. The solution of the barium salt after removing the $BaSO_4$ reduces Fehling's solution. The barium salt is precipitated by means of alcohol; on liberating the

acid from this and adding phenylhydrazine and sodium acetate, a crystalline osazone, m.p. 215°C., is obtained. The free acid gives pentose reactions, and forms a colourless syrup which deposits hard crystals.

Mannite does not occur ready formed in licorice, but is a product of the hydrolysis of glycyrrhetinic acid. No mannite is found if glycyrrhizin is isolated as above by precipitation with alcohol, but its presence is readily detected after treatment with H_2SO_4. Glucose, however, accompanies glycyrrhizin in the drug. (See also *Year-Books*, **1871,** 217 ; **1876,** 93 ; **1879,** 165 ; **1880,** 47, 49 ; **1881,** 255 ; **1899,** 99, 129 ; **1902,** 107, 106.)

Gums, Reactions of, with Nessler's Reagent. J. Vamvakas. (*Annales de Chim. Analyt.*, **12,** 12.) With *almond-tree gum* in a strong aqueous solution, Nessler's reagent gives a cream-coloured precipitate on shaking or warming. The reaction does not occur with dilute solutions of the gum, nor is a precipitate produced in the presence of tartaric acid. *Gum acacia* gives a cloudy dirty grey emulsion when a 30 per cent. solution is shaken with Nessler's reagent. On standing, a grey precipitate falls. If heat be applied this forms at once, but only a slight precipitate is obtained in the presence of tartaric acid.

Tragacanth gives no reaction either in the cold or on warming with Nessler's reagent. But if tartaric acid is added before the reagent and the mixture is boiled, a dull orange turbidity is produced, which forms a precipitate on standing.

Gutta-percha from the Leaves of Palaquium treubi. E. Jungfleisch and H. Leroux. (*Journ. Pharm. Chim.* [6], **24,** 1.) The investigation shows that the so-called fluavil is not a simple body, but is separable by solvents into several constituents. Among these is *paltreubin*, $C_{30}H_{50}O$, isomeric with amyrin (*Year-Book*, **1905,** 72).

The powdered leaves of the plant were first treated with dilute soda, washed to remove waxy matter, dried, then extracted with toluol. The toluol extract was concentrated *in vacuo*, and the still liquid residue poured with constant agitation into twice its volume of boiling alcohol. A hydrocarbon present was thus almost wholly precipitated, while the alban and fluavil bodies remained in solution. The hydrocarbon was aggregated by digestion for some hours under a reflux condenser, then filtered

out. It was redissolved in toluol, and reprecipitated with alcohol. The process was repeated a third time to remove all the soluble bodies. The pure hydrocarbon was reserved for future examination. The bulked alcohol-toluol solutions on standing deposited wax and some paltreubin, m.p. 260°C., the latter separating more slowly. The wax being elminated as far as possible, the alcohol was distilled off; the residue, treated with boiling alcohol, gave a further quantity of wax and paltreubin. After separating these, the mother-liquor slowly deposited spherical translucent nodules, containing, among other bodies, a crystalline substance, m.p. 240°. The residue obtained by distillation, after separating these, is the body which has been named fluavil, but it is not a simple substance. Its solution in petroleum ether gave crystals of all the substances enumerated above.

Paltreubin is deposited in small silky needles, m.p. 260°C., from benzol solution; when slowly heated it sublimes at 230°C. Like its isomer, amyrin, it forms two isomeric esters, which, when saponified, yield α- and β-paltreubylic alcohol. Thus, when heated to 175°C. in a sealed tube with acetic anhydride two acetates are formed, one soluble, the other insoluble in ether. Recrystallized from benzol, the former separates in prisms, m.p. 235°C., the latter in needles, m.p. 290°C. The first when saponified gives α-paltreubylic alcohol, $C_{30}H_{49}OH$ in needles, m.p. 190°C. It is optically inactive. The second ester gives β-paltreubylic alcohol on saponification, crystallizing in very fine felted needles, subliming between 270–275°C. Although this polymer is not met with, as such, in the gutta of *Palaquium treubi*, it has been found in that of the leaves of *P. gutta* and *P. borneense*.

Hardwickia pinnata, Oleoresin of. D. Hooper. (*Pharm. Journ.* [4], **24,** 4.) Two samples of the genuine oleo-resin of *Hardwickia pinnata*, received in the Indian Museum, Calcutta, have been examined. One sample was obtained from the Papanasam Hills, Tinnevelly, and the other from South Kanara. They were both thick dichroic fluids, with peculiar odour; the first of butyric acid, and the second piperaceous. It might be incidentally remarked that the oil is used in medicine and for painting the woodwork of houses. The following figures were obtained on examination of the samples:—

	Tinnevelly	South Kanara
Specific gravity	1·0124	1·0068
Per cent. of volatile oil	41·1	39·48
Acid value	97·2	99·8
Ester value	9·0	12·6
Saponification value	106·2	112·4
Iodine value	130·3	119·8
Acid value of resin	159·0	157·7

The oleo-resins were freely soluble in 90 per cent. alcohol, ether, chloroform, petroleum ether, and glacial acetic acid; they dissolved in solution of ammonia with a slight cloudiness, and ultimately gelatinized. A few drops mixed with a few drops of strong sulphuric acid resulted in the formation of a brown solid. Two drops dissolved in 1 c.c. of glacial acetic acid gave a brick-red deposit with one drop of sulphuric acid.

Heracleum giganteum, Essential Oil of. (*Schimmels' Report, October*, **1906**, 41.) The oil distilled from the ripe fruit had the following characters :—sp. gr., 0·8722 at 15°C.; $a_D + 1°14'$; acid value, 1·6; ester value, 288·3; acetyl value, 314·2; solubility in alcohol 80 per cent., 1 : 1 and more. The oil was colourless and resembled *H. spondylium* oil in odour.

Heracleum spondylium, Essential Oil of. (*Schimmels' Report, October*, **1906**, 41.) The oil is obtained from the fruit or the entire umbels of *Heracleum spondylium*. The oil from the umbel stalks, from which the fruit had been removed, was found to differ in odour from that of the fruit alone; sp. gr., 0·9273; $a_D - 0°48'$; acid value, 16·2; ester value, 148·6 acetyl value, 195·9; solubility in alcohol, 80 per cent. 1 : 1·1 with separation of paraffin when more solvent was added. The oil from the fruit alone had the following characters: sp. gr., 0·8744 to 0·8798; $a_D - 0°38'$ to $+1°6'$; acid value, 7·3 to 15·9; ester value, 215·4 to 247·4; acetyl value, 276·3 to 285·3; solubility in 80 per cent. alcohol 0·8 to 1 : 1.

Herring Oil, Japanese. C. E. Sage. (*Chem. and Drugg.* **69,** 385.) A consignment of this oil recently appeared in the London market. The oil had the following characters :—Colour, pale brown; sp. gr. at 20°C, 0·9116; acid value, 16·8; saponification value, 193·7; iodine value, 137·0.

Hevea braziliensis, Constituents of the Seeds of. W. R. Dunstan. (*Proc. Chem. Soc.*, **23,** 168.) The kernels of the

seeds of the Para rubber tree were found to contain 50 per cent. of fixed oil; sp. gr., *0 9302 at 15°C; saponification* value, 206·1; iodine value, 128·3. In characters it resembled linseed oil, drying to a transparent varnish on exposure to the air. When ground in water small quantities of prussic acid and acetone were formed indicating the probable presence of a cyanogenetic glucoside similar to phaseolunatin (*Year-Book*, **1904,** 140). The enzymes present in the seed hydrolize its oil and also olive oil, so that in addition to the ferment hydrolizing the glucoside, a lipase is also present. Von Romburgh has shown that the leaves of *Hevea braziliensis* also yield HCN on contact with water, and Harrison has obtained the same decomposition product from the seeds of *H. pauciflora* and *H. confusa.*

Honey, Method of Examination prescribed in French Official Laboratories. (*Annales de Chim. Analyt.*, **12,** 258.) To ensure thorough bulking the honey should if possible be melted and stirred up before drawing the sample. Twenty-five Gm. is then weighed off, dissolved in water and made up to 250 c.c. A portion of this solution is at once centrifugated and the deposit obtained examined under the microscope. No starch grains should be seen. Clean honey should contain no portion of the organs of bees; only pollen grains and particles of wax should be found.

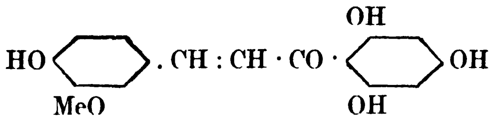
Sugars. Two determinations are to be made with aliquot parts of the above solution, by means of Fehling's solution, one before, the other after inversion. The difference in the two results is expressed in terms of saccharose by multiplying it by 0·95.

Optical rotation should be observed both before and after inversion, in a 10 per cent. solution.

Detection of Dextrin. Dissolve 25 Gm. of the honey in 250 c.c. of water, add 5 Gm. of yeast, free from starch, and allow to ferment at 30° for three days; filter, take 200 c.c. of the filtrate and evaporate to about 25 c.c. Pour this liquid drop by drop into 100 c.c. of alcohol 95 per cent. Allow to stand for 2 or 3 hours, collect the precipitate on a filter, wash with alcohol, redissolve with boiling water, make up to 50 c.c. and take the optical rotation. If this is markedly dextro-rotatory determine the reducing power, calculate this into glucose and deduct this from the previously observed rotation. If the remainder indicates a dextro-rotation the presence of dextrin is practically certain, and by inference, added glucose.

Homo-eriodictyol, Constitution of. H. B. Power and F. Tutin. (*Proc. Chem. Soc.*, **23,** 133.) Homo-eriodictyol $C_{16}H_{14}O_6$ is isomeric with hesperitin, but its sodium compound has the normal formula $C_{16}H_{13}O_6Na$. It contains one methoxyl group, and forms a tetra-actyl derivative $C_{16}H_{10}O_6\,(COMe)_4$ m.p. 154°C. When hydrolized with strong aqueous KOH it gives phloro-glucinol and ferulic (4-hydroxy-3-methoxycinnamic) acid. On fusion with KOH protocatechnic acid is formed.

It is therefore concluded that homo-eriodictyol has the following constitution :—



Mossler's eriodictionon is evidently homoeriodictyol.

Eriodictyol $C_{15}H_{12}O_6$ m.p. 267, contains no methoxyl group. It gives two compounds when acetylized, one with the m.p. 137°C the other 195–196°C. Homoeriodictyol is probably the monomethyl ester of eriodictyol.

Hordenine, Some Derivatives of. E. Léger. (*Journ. Pharm. Chim.* [6], **25,** 73.) A number of derivatives, both of the phenolic and amine functions of hordenine, have been prepared and are described in detail.

Hydrastine, Determination of, in Fluid Extract of Hydrastis. A. W. van der Haar. (*Apoth. Zeit.*, **21,** 1050.) Ten Gm. of the liquid extract is mixed in a tared flask with 20 c.c. of water and evaporated to 10 or 11 Gm. ; 1·5 c.c. of HCl, 12·5 per cent. is then added and the weight is made up to 20 Gm. with water. When cold 0·5 Gm. of Kieselguhr is thoroughly stirred in and the mixture filtered. Ten Gm. of the filtrate is then treated in a 100 c.c. flask with 4 c.c. of solution of AmOH 10 per cent., and 25 c.c. of ether ; after shaking for some minutes 25 c.c. of petroleum ether is added and then 1·5 Gm. of powdered tragacanth. Forty c.c. of the ethereal solution is decanted into a tared flask and evaporated to 10 Gm. The flask is then corked and set aside for several hours in a cold place. The mother-liquid is then carefully decanted, the crystals of hydrastine are washed with a little ether, dried on the water-bath and weighed.

Hydrocyanic Acid, Presence of, in Argentine Grasses of the genus Stipa. A Hébert. (*Bull. Soc. Chim.*, **35,** 919.) Three species of grasses of the genus *Stipa*, indigenous to the Argentine, known locally as *Viscachera Azul-Pampa*, *Viscachera purcara* and male *Viscachera pusques* have been examined. Of these, only *Viscachera purcara* was found to yield any quantity of hydrocyanic acid, but this contained a notable amount equivalent to 0·02 per cent. on the dry material. A ferment capable of hydrolizing amygdalin was also present. This particular grass therefore is dangerous to grazing stock. It is stated that native cattle refuse to touch this grass, but that imported stock graze on it with fatal results.

Hydrocyanic Acid, Phthalophenone Test Paper for the Detection of. — Thiery. (*Journ. Pharm. Chim.* [6], **25,** 51.) Weehuizen has shown that when an alkaline solution of phthalophenone is added to a liquid containing HCN, followed by a few drops of $CuSO_4$ solution, a red colour, due to the formation of phenolphthalein results. The test is rendered more delicate when it is applied with test paper prepared thus: A sheet of white filter paper is moistened with a 1 : 2,000 solution of $CuSO_4$ dried and cut into strips. Meanwhile an alkaline solution of phthalophenone is thus prepared: 0·5 Gm. of phenolphthalein is dissolved in 30 c.c. of absolute alcohol and sufficient water is added to produce a faint turbidity; to this 20 Gm. of NaOH is added. Aluminium dust is then slowly added to the red alkaline solution until the colour is entirely discharged. Sufficient distilled water, previously boiled and kept from contact with the air, is then added to bring the volume to 150 c.c. In applying the test, the $CuSO_4$ paper is moistened with a little of this reagent and immersed in the liquid to be tested. A rose tint is obtained in the presence of 1 : 2,000,000 of HCN almost at once; and with cherry laurel water diluted to 1 : 500 or even 1 : 1,000 the tint is evident in a few hours. In a similar manner a mixture of 2 Gm. of haricot beans containing the cyanogenetic glucoside with 40 Gm. of ordinary beans, gives a sharp reaction when thus tested.

Hydrocyanic Acid, Presence of, in Java, Burma, and Haricot Beans. R. R. Tatlock and R. T. Thompson. (*Analyst*, **31,** 250.) The colour of Javan beans is not found to be any

guide as to the amount of hydrocyanic acid they contain. An average sample was separable into beans of 5 colours, white, brown speckled purple and black. These yielded the following percentages of HCN: white, 0·027; brown, 0·038; speckled, 0·038; purple, 0·031; black, 0·042, an average of 0·036 per cent. The husk of the beans is found to contain much less, 0·003 per cent. of HCN, than the decorticated portion, which gave 0·03 per cent. Among the other kinds of beans and peas examined, the following gave no HCN: English, Morocco, Smyrna, large haricot, small Chili haricot, Paiyin beans, gram, Calcutta white and grey peas, Odessa and Mutter peas. HCN was found in the following percentages in the beans named: Java beans, 0·027 to 0·137; Rangoon or Burma beans, 0·005; small Rangoon haricots, 0·009; small haricots 0·006 to ·001. The haricots were all sold for human food. (See also *Year-Book*, **1904**, 140.)

Hydrogen Peroxide, Presence of Acetanilide in certain Specimens of. C. H. La Wall. (*Amer. Journ. Pharm.*, **78,** 582.) Attention was directed to certain samples of commercial H_2O_2 solution by the peculiar odour of nitrobenzol they gave off. It was found to be due to the presence of a small amount of acetanilide, added as a preservative. The addition is effective for this purpose: the samples of "10 volume" H_2O_2 which were over 4 months old, still gave from 9·5 to 10·5 volumes of oxygen. The odour does not appear until the peroxide is about 4 months old. The acetanilide is isolated by shaking out with $CHCl_3$; on evaporating the solvent the residue may be identified by the characteristic isonitrile reaction.

Hydrogen Peroxide, preserving with Sodium Chloride or Calcium Chloride.—Allain. (*Journ. Pharm. Chim.* [6], **24,** 162.) NaCl or $CaCl_2$ in the proportion of 10 Gm. per litre are found to be more effective as preservatives than the substances generally employed for that purpose. Hydrogen peroxide with either of these salts in solution in the proportion indicated is found to retain its strength ten times longer than with H_3PO_4, H_2SO_4 or alcohol. NaCl is specially suitable for use with peroxide intended for medicinal use, since it is free from all irritant properties and is itself an antiseptic.

Hydrogen peroxide is found to keep better in nonactinic glass bottles than in blue or white vessels.

For the transmission of the peroxide the following simple expedient has been found serviceable in avoiding loss by bursting of the bottles. The vessel is closed with an ordinary cork which is pierced by a thick glass tube with a capillary opening. This prevents the occurrence of pressure from the oxygen liberated through agitation and obviates undue loss by evaporation. A wickered carboy, thus treated, containing 5 litres of 12 volume hydrogen peroxide, withstood the journey from Paris to Algiers and back without mishap. (See also *Year-Book*, **1906**, 135.)

Hydrogen Peroxide, Valuation of, by Means of Ammoniocupric Solutions. — Claessens. (*Répertoire* [3], **18**, 504.) When hydrogen peroxide is mixed with an ammoniacal solution of a copper salt, half its oxygen is quantitatively evolved and water formed. The ammoniosulphate of copper reagent or a similar solution of a copper salt is therefore a useful means of determining the value of H_2O_2 solution; the operation may be conveniently conducted in a nitrometer, the volume of gas evolved giving approximately the volume of available oxygen. Thus a 5 c.c. of the "10 volume" H_2O_2 would yield 50 c.c. of oxygen.

Hydrogen Sulphide, Preparation of, from Aluminium Sulphide. H. Fonzes-Diacon. (*Bull. Soc. Chim.* [4], **1**, 36.) Pure H_2S may be conveniently prepared by the action of water on aluminium sulphide. In preparing the sulphide the precaution should be taken to pack the mixture of sulphur and aluminium powder tightly in the crucible with a superimposed layer of MgO, otherwise the action is so violent that much of the product is projected from the vessel and lost. With this precaution a good yield of sulphide is readily obtained. On allowing water to fall, drop by drop, on the sulphide in a suitable flask, pure H_2S free from acid is evolved. The current of gas ceases as soon as the dropping of the water is stopped.

Indol and Skatol, Separation of. C. A. Hester and M. L. Forster. (*Mercks' Report*, **1906**, *Pharm. Zeit.*, **52**, **435**.) A 2 per cent. solution of sodium β-naphtho-quinonesulphonate precipitates indol quantitatively from alkaline solutions of indol and skatol. The indol compound is then filtered out, the filtrate distilled and skatol determined colourmetrically in the distillate with Erlich's dimethylamido-benzaldehyde reagent.

Intestinal Worms, Urine Test to Detect Presence of. J. Jefimov. (*Nouveaux Remèdes*, **23,** 212.) It is stated that if 5 or 10 drops of acid solution of mercuric nitrate be added to 10 c.c. of urine and the mixture be boiled, the precipitate formed will remain white if the patient be free from intestinal parasites. If these are present, a greyish or black colour will be evident. The presence of sugar, indican, or albumin, does not interfere with the reaction.

Ipomoea hederacea, Constituents of. D. Hooper. (*Pharm. Journ.* [4], **13,** 258.) The seeds, known in India as kaladana, have the following percentage composition :—

Moisture, 9·40 ; fat, 14·02 ; resin, 8·05 ; albuminoids, 22·68 ; carbohydrates, 31·55 ; fibre, 8·40 ; ash, 5·90.

The seeds are comparatively rich in nitrogen. The presence of a nauseous fat is a disadvantage in a medicine administered internally. The resin resembles convolvulin of jalap.

Ipomoea turpethum, New Glucosides from. E. Votocek and J. Kustner. (*Apoth. Zeit.*, **22,** 259.) Besides the resin insoluble in ether which has been named turpenthin, *Ipomoea turpethum* contains an ether soluble glucosidal resin which the authors call turpethein. This is separable by petroleum ether into two portions on soluble named a-turpethein, the other almost insoluble β-turpethein. Alpha-turpethein is soluble in barium hydrate solution. On hydrolysis it yields rhamnose, a non-volatile oxyacid $C_{16}H_{32}O_6$ which is isomeric with tampicolic, jalapinic and ipomeolic acids ; and a volatile fatty acid probably some of the valerianic acids. Beta-turpethein when hydrolized gives rhodeose, glucose and a non-volatile higher fatty acid of the C_5 series.

Iron Oxide. C. A. Hill and J. C. Umney. (*Pharm. Journ.* [4], **23.**) The communication deals with the history and etymology of the various forms of ferric oxide used in medicine and as pigments. To reduce the confused nomenclature at present in use to more definite terms, it is proposed to call the brown preparation containing about 80 per cent. of Fe_2O_3 obtained by precipitating ferric sulphate, the hydrated peroxide of iron of the D.Ph. 1850 and the B.P., 1864, 1867 and 1885, *Ferri Oxid. Precip. Fusc.* The dull red powder, containing about 85 per cent. of Fe_2O_3 obtained from ferrous sulphate and known

as Ferri Carb., Ferri Carb. Solubilis, Ferri Subcarb. should be called *Ferri Oxid. Precip. Rub.*

The oxide obtained by calcining the ferrous sulphate might conveniently be called *Ferri Oxid. Calc.*

Jalap, Examination of Recent Samples of. T. G. Joyce. (*Chem. and Drugg.*, **70,** 488.) Of 13 samples of jalap recently examined one only gave 11·46 per cent. of resin; the majority yielded between 6 and 8 per cent., while the lowest gave only 5·05 per cent. The highest percentage of the resin soluble in ether was 33·56, the lowest 6·89 per cent.

Jalap, Resin Value of. (*Evans' Analytical Report*, **1907**, 21.) The average resin value of the genuine tubercles at present met with in commerce is about 7 per cent. The lowest was 4·2 per cent., the best 13·3 per cent. The B.P. quality can now only be obtained with difficulty. When drawing samples of the drug for analysis at least 2 pounds should be crushed to coarse powder to ensure a representative sample.

Japan Wax. (*Southall's Report*, **1907,** 12.) The following are the results obtained from the examination of five samples of Japan wax:—Melting-point, 52° to 53°; iodine absorbed, 8·64 to 12·17 (average 10 55 per cent.); saponification number, 206·7 to 223 6 (average 217·7 per cent.).

Japanese Medlar, Eryobotrya japonica, Cyanogenetic Glucoside in the Seeds of. H. Hérissey. (*Journ. Pharm. Chim.* [6], **24,** 350.) Although Lehmann in 1885 isolated a crystalline glucoside from the seeds of *Eryobotrya*, he was not able to identify it definitely, considering it to be probably laurocerasin. The author has re-investigated the matter, treating the fresh seeds by the process of Bourquelot and finds that the glucoside is amygdalin, which occurs alone. It is not present in the leaves of the plant, at any rate at the period when they were examined, but they contained 0·66 per cent. of saccharose.

Jasminium nudiflorum and other Jasmins, Presence of Syringin and Jasmiflorin in. J. Vintilesco. (*Journ. Pharm. Chim.* [6], **24,** 529.) Having submitted the branches of *Jasminium nudiflorum* to the method of Bourquelot for the detection of glucosides, indications of the presence of what was

at first thought to be one such body was obtained; further investigation proved, however, that the supposed glucoside was a mixture of syringin and a new amorphous glucoside jasmiflorin. It accompanies syringin in the yellow alcoholic liquid and in the residue left by acetic ether in the method of Bourquelot and Danjou (*Year-Book*, **1906**, 76). This alcoholic solution was evaporated to dryness and redissolved in water and again evaporated. The residue was extracted several times with alcohol 95 per cent., then washed once with ether and dried *in vacuo* over H_2SO_4. A brown amorphous powder was thus obtained. It still contained syringin, so it was extracted in a reflux apparatus with a mixture of chloroform 3 vols. and alcohol 1 vol. It still contained traces of syringin and also of jasmipicrin. To separate the latter, the amorphous product after separating the greater part of the syringin was dissolved in water, was precipitated first by neutral lead acetate, then by basic lead acetate, and finally the filtrate from the basic lead acetate was treated with ammonia; these three lead precipitates were collected apart, then decomposed with H_2SO_4 and excess of acid neutralized with $BaCO_3$. The solutions were distilled to dryness and the residues extracted with alcohol. From the neutral lead acetate precipate jasmipicrin was separated as an amorphous brown body frothing strongly with water, colouring Fehling's solution green but not reducing it even after boiling with dilute acids. Jasmiflorin was isolated from the basic lead acetate precipitate. It is amorphous and possesses glucosidal properties. It differs from syringin in being thrown out of solution by basic lead acetate. Its $a_D = +145°$; emulsin hydrolizes it with the production of an insoluble body. Jasmiflorin does not reduce Fehling's solution until hydrolized with acids. With strong H_2SO_4 it gives a red brown colour which changes to yellow when diluted with water and deposits a brown flocculent precipitate. Syringin under similar conditions gives a blue precipitate. The basic lead acetate precipitate obtained in the presence of ammonia also contains amorphous glucosidal matter which may or may not be identical with jasmiflorin.

Schlagdenhauffen and Reeb (*Union Pharm.*, **48,** 49) have also reported the occurrence of an amorphous glucoside which they have named jasminin in *J. fruticans*, a species closely allied to *J. nudicaule*, but since in one portion of their note they state that basic lead acetate is employed to purify the solution of the glucoside, while in describing its characters they state that it is

precipitated by that reagent, no definite statement as to its relation to jasminin can be made. But the author has proved that *J. fruticans* contains syringin. A glucosidal body also occurs in *J. officinale*, but this has not yet been definitely identified.

Jasminium officinale, J. nudicaule, and J. fruticans, Mannite in. J. Vintilesco. (*Journ. Pharm. Chim.* [6], **25,** 309, 373.) Dextro-mannite has been isolated in a crystalline condition from these jasmins.

Juniper Needles, Essential Oil of. R. E. Hanson and E. N. Babcock. (*Journ. Amer. Chem. Soc.*, **28,** 1198; *Schimmels' Report, April,* **1907,** 60.) Hanson and Babcock obtained from the branches and needles, free from berries, of *J. communis*, distilled in May, 0·15 to 0·18 per cent. of bright yellow oil, sp. gr. 0·8531 at 20°C.

Schimmels have recently examined a Russian oil obtained from berries and needles which had the following characters:—sp. gr., 0 8675 at 15°C.; a_D+8° 46′; ester value, 11·4; solubility in alcohol 90 per cent., 1 : 6, and more with slight turbidity. It differs from ordinary juniper oil in being dextro-rotatory. The dextro-gyre Russian juniper oil previously examined (*Year-Book*, **1904,** 100), was probably distilled from similar material.

Juniperus phoenica, Essential Oil of. J. Rodié. (*Bull. Soc. Chim.* [3], **35,** 922.) The oil examined was derived from shoots about to flower, but not yet bearing berries, by water-distillation over a naked fire from material which had been cut for some weeks. Probably these conditions account for the different physical characters of the oil from that reported on by Umney and Bennett (*Year-Book*, **1906,** 44). Five specimens ranged in sp. gr. from 0·867 to 0·868, and had the a_D from + 2° 54′ to +4° 10′; solubility in alcohol 90 per cent., 1 : 4 to 1 : 5. On fractionation 92 per cent. of the oil was found to consist of terpenes, chiefly dextro-pinene, with a small amount of lævo camphene and phellandrene. The first drop of the distillate had a distinct acetone odour. The higher boiling fraction, above 180°C., is under investigation.

Juniperus virginiana Leaves, Essential Oil of. I. W. Brandel. (*Proc. Amer. Pharm. Assoc.*, **1906,** 459.) Commercial cedar-leaf oil is generally obtained from the needles of

Juniperus virginiana and *Thuja occidentalis* indiscriminately. The leaves of *J. virginiana* employed to distil the oil under notice were obtained in the autumn, in the vicinity of Seattle, Washington, and were distilled fresh; they yield 0·47 per cent. of light yellow oil with a characteristic pleasant odour. Sp. gr., 0·9130 at 15°C.; $a_{D20°}$ +2°; the greater part boiled between 190°–198°C. Commercial cedar oil consists mainly of terpenes boiling below 180°C. It had the saponification value 11·1, and the acetyl value 30·3; equivalent respectively to 3·89 per cent. of bornyl acetate and 8·28 per cent. of total borneol. The fraction 190–195°C. had the odour of fenchone, but no crystalline oxime was obtained from it.

Jute Seeds, Corchorus, Properties of certain. R. Kobert. (*Apoth. Zeit.*, **22,** 179.) The seeds of *Corchorus fascicularis* are mucilaginous, sweet and edible; those of *C. olitorius* have a purgative action; *Corchorus capsularis* and the var. *bengalensis*, also *C. acutangulus*, *C. argutus*, and *C. trilocularis* have seeds containing fat, and the last three a green fluorescent body and the highly toxic, extremely bitter glucoside, corchorin. Consequently these three last-named seeds are poisonous. Corchorin is readily soluble in water and in alcohol, but, being insoluble in ether, chloroform, or benzol, it cannot be shaken out with those solvents. It is only very slightly precipitated by neutral lead acetate, but is thrown down by ammoniacal lead acetate, and is also thrown out of concentrated aqueous solutions by addition of ammonium sulphate. It gives a bluish-green colour reaction with strong H_2SO_4, and resembles digitalin in its physiological action and intense toxicity. It is hydrolized by boiling with dilute acids, forming sugar and a decomposition product which is insoluble in water and in acids, but dissolves in alcohol.

Kamala and Rottlerin. H. Telle. (*Archiv. Pharm.*, **244,** 441.) The author confirms the empirical formula of rottlerin as $C_{11}H_{10}O_3$ as found by Anderson and later by A. G. Perkin (*Year-Book*, **1894,** 162). The kamala examined contained from 10 to 12 per cent. of this body, which was extracted by boiling the drug first with ether, then with benzol, and recrystallizing the ether and benzol extracts from the latter solvent. It had the m.p. 203–204°C. When treated with Ba2(OH) it gave methylphloroglucin and pseudorottlerin, a body isomeric with rottlerin; this formed violet-brown crystals. Dimethyl-

phloroglucin, probably trimethylphloroglucin, hydrocinnamic acid, and acetic acid were identified among the reduction products on boiling rottlerin with NaOH and zinc dust. Its molecular formula has yet to be established.

Kola Nuts from Gold Coast. (*Bull. Imp. Inst.*, **5**, 20.) White and red kola nuts both fresh and dry from the Gold Coast have been examined. The *fresh white* seeds contained 67·7 per cent. of moisture, 0·76 per cent. of alkaloids, or 2·36 per cent. on the dry material. The *fresh red seeds* gave 55·9 per cent. of moisture with 0·88 per cent. of alkaloids, or 2·00 per cent. on the dry seeds. *Dry white seeds* gave 11·8 per cent. of moisture, 2·19 per cent. of alkaloids, equivalent to 2·48 per cent. on dry substance. *Dry red seeds* contained 15·6 per cent. of moisture, 1·97 per cent. of alkaloids, or 2·33 on the dry drug. These results do not confirm the view that the nuts show any marked deterioration on drying.

Kolatin, Further Notes on. — Goris. (*Comptes rend.*, **144**, 1163.) The body kolatin, previously described (*Year-Book*, **1906**, 44) crystallizing in prismatic needles is found to have the formula $C_8H_{10}O_4$, and to possess phenolic characters. Under certain conditions it is oxidized, giving an insoluble red powder, kola red. From its phenolic character, it acts as a solvent of caffeine similarly to benzoate or salicylate of sodium, but to a less extent. In dried nuts, either whole or powdered, and in pharmaceutical extracts, it no longer exists, having been completely destroyed by oxidation. Fresh or sterilized kola nuts, as well as the combination of caffeine and kolatin, only yield traces of the base to $CHCl_3$; but in the presence of water dissociation takes place, caffeine is set free, and is then removable by $CHCl_3$.

To extract kolatin, the fresh nuts are sliced and thrown at once into boiling alcohol, to destroy ferments (as Bourquelot recommends). After extraction by boiling the alcoholic extracts are bulked and distilled *in vacuo* in the presence of $CaCO_3$, to a syrupy consistence. Free caffeine is removed from this residue by shaking out with $CHCl_3$ which also removes a resinoid impurity. This treatment is continued as long as the solvent is coloured. Finally, an excess of $CHCl_3$ is left in contact with the extract in a cool place for some days. Crystals appear in the syrupy liquid, slowly at first, then more rapidly until a white

crystalline mass is formed. This is drained on the filter pump and washed with water containing a little alcohol. The white crystalline cake is dried over H_2SO_4, powdered, and extracted several times with boiling $CHCl_3$ to remove any free caffeine. It is then redissolved in 30 per cent. alcohol and crystallized over H_2SO_4. This body is probably a feeble combination of caffeine with kolatin. On treating it with a little hot water it is split up into its constituents; the caffeine is removed by shaking out with $CHCl_3$ and the aqueous portion, evaporated *in vacuo* over H_2SO_4, furnishes crystals of kolatin. Instead of operating on fresh kola nuts with alcohol, the ferments may be conveniently destroyed by subjecting the whole fresh nuts to 105°C. for 10 minutes in an autoclave, then reducing them to powder. This powder is extracted with alcohol 80 per cent.. and the alcoholic extract is treated as above.

Kuromoji, Essential Oil of. (*Schimmels' Report, April*, **1907,** 61.) Two samples of this oil similar in character have been received in recent years from Japan. Both these differ from the oil generally met with in commerce under that name. These oils were yellow, had an odour like coriander; sp. gr., 0·8942 at 15°C.; a_D—7° 35; ester value, 27·3. They were found to contain cineol, terpenes, linalol and geraniol, the latter chiefly is acetate. They differ entirely from kuromoji oil previously examined.

Lactic Acid, Reaction for. — Thomas. (*Apoth. Zeit.*, **22,** 206.) Sufficient chromic acid is added to the solution to impart a light yellow colour. The mixture is then warmed on the water-bath. In 10 minutes a reddish-brown colour will be given by a trace of lactic acid. The presence of small quantities of hydrochloric, butyric, or acetic acids and of acetone or alcohol, does not affect the yellow colour. The test is useful to detect lactic acid in the gastric secretion. Six c.c. of the fresh liquid is somewhat concentrated on the water-bath, then treated as above with 3 or 4 drops of 30 per cent. chromic acid solution.

Lanoline, Determination of, in Soap. K. Braun. (*Seifenfabrikant*, **1907,** 257; *Analyst*, **32,** 218.) Ten Gm. of the soap is dissolved in water and treated with concentrated $CaCl_2$ solution. The precipitate formed is collected on a filter, dried at 60°C., and extracted in a Soxhlet apparatus with acetic ether. On evaporating the solvent the lanoline is left.

Lavender, Influence of, Method of Distillation on Quality of Essential Oil of. (*Schimmels' Report, April,* **1907,** 62.) Comparative experiments conducted at Barrême with dry steam and with water distillation, prove conclusively that a higher yield of oil with a richer percentage of esters is obtained in a shorter time by the former method than by the old-fashioned and generally followed process of water distillation. It is further found that fresh flowers give a better result than those which have been partially dried.

The following table shows the difference with the two methods :

Method of Distillation	Sp gr. at 15°C.	α_D	Per cent of Esters.	Yield per cent.	Solubility in Alcohol 70 per cent.
Dry steam . .	0·8894	−8°4′	50·9	0·81	1 : 6 to 1 : 7 with faint opalescence
Water . . .	0·8871	−6°47′	44·0	0·71	1 : 3
Dry steam . .	0·8905	−8°	53·7	0·82	1 : 7 with faint opalescence
Water	0·8880	−6°21′	43·6	0·75	1 : 3·3·

This shows that there is considerable loss of esters by saponification under the old method.

It is found that lavender flowers lose from 35 to 47 per cent. in weight during drying with a considerable loss of oil, the terpenes being the portion of the oil to be lost, consequently the oil from the dry flowers is richer in esters.

The influence of variation of soil on the constituents of lavender oil is fully confirmed by the results of dry steam distillation conducted at Sault in Vaucluse under precisely similar conditions to those above at Barrême in Basses Alpes. The lavender grown at Sault gave an oil yielding only 36 to 43 per cent. of linalyl acetate, and was less soluble.

Lavender Oil, Detection of Ethyl Citrate as an Adulterant in. (*Schimmels' Report, April,* **1907,** 67.) About 3 Gm. of the suspected oil is saponified with alcoholic KOH solution, then neutralized with HCl and evaporated to dryness. The residue dissolved in water, and the aqueous solution is shaken out with ether to remove resinous matter. After filtration, the aqueous portion is heated with $CaCl_2$ solution. If citric acid is present a precipitate appears which redissolves when the liquid cools.

Lead, Detection and Determination of, in Zinc and its Com-

pounds. T. T. Cocking. (*Chem. and Drugg.*, **69,** 507. Three methods have been used for determining lead in zinc oxide :

(1) The substance is dissolved in excess of acetic acid, boiled, and filtered. A little K_2CrO_4 is now added, and the whole heated on the water-bath for some hours. After standing for 24 hours, the precipitated $PbCrO_4$ is filtered off and thoroughly washed with 5 per cent. acetic acid (hot). It is then dissolved in a little dilute HCl, sodium acetate added in excess, and the Pb reprecipitated with K_2CrO_4, filtered off through counterpoised filter-papers, washed with 5 per cent. acetic acid, and finally with water, dried at 100°C., and weighed.

By this reprecipitation any zinc or iron chromate which may have been carried down with the lead chromate in the first precipitation is eliminated.

It is a well-known fact that on addition of hydrogen sulphide to an alkaline solution containing lead and zinc, the lead is precipitated before the zinc, and it is on this reaction that the following gravimetric process, in which the lead is finally weighed as sulphate, and also a colorimetric process of estimation, are based :

(2) The ZnO is dissolved in acetic acid, the solution made strongly alkaline with AmOH and filtered. A small quantity of AmHS (sufficient to precipitate all the Pb and only a small portion of the Zn) is now added, and the whole warmed and filtered. The filtrate should be tested for Pb by adding a few drops of dilute SH_2 water. If no darkening takes place, it may be rejected. The precipitate now contains the whole of the Pb, together with a little of the Zn and any Fe present, as sulphides. This is washed first with dilute AmOH and then with water, and dissolved in hot concentrated HCl. A little strong H_2SO_4 is now added and the whole evaporated on the water-bath until all the HCl is expelled ; 20 per cent. alcohol is added, and the precipitated $PbSO_4$ filtered off, ignited, and weighed in the usual manner.

The results thus obtained agree very closely with those obtained by the chromate method.

As these gravimetric analyses occupy a good deal of time, the following colorimetric method was devised :

Seven grams of the substance ($ZnSO_4$, for example) is dissolved in water ; ammonium acetate, excess of AmOH and KCN are successively added, and finally a little *very dilute* SH_2 water. The brown colour which is produced is due to Pb, and is matched in a " dummy " solution containing the same reagents.

In the case of metallic Zn, ZnO, and $ZnCO_3$, however, a special procedure has to be followed, as these substances are so heavily contaminated with Pb that only a very small quantity can be used for the test.

For this process a solution of ammonio-acetate of Zinc, lead-free, is required. This is prepared by dissolving ZnO in acetic acid, adding excess of AmOH, and a small quantity of AmHS, and filtering exactly as described above for the precipitation of the Pb as PbS in the estimation as $PbSO_4$, in fact, the filtrate from that is used in actual practice. This solution is conveniently made to contain the equivalent of 10 per cent. of ZnO, and is kept as a stock solution.

(3) For the test, 1 Gm. of ZnO (for example) is dissolved in acetic acid and made up to 100 c.c. with water. Five c.c. of this solution is placed in the Nessler glass, together with 20 c.c. of the ammonio-acetate of Zinc solution (=2 Gm. ZnO); AmOH, KCN, and *very dilute* SH_2 water are successively added, and the brown colour produced is matched by the addition of Pb to a dummy solution, also containing the same reagents. The amount of Pb which it is found necessary to add to the latter in order that there may be equality of colour upon the addition of AmHS is the quantity present in 0·05 Gm. of the ZnO.

After standing some time the solution will become cloudy from precipitation of ZnS, but it remains perfectly clear for such time as amply suffices for completing the test. If the solution of sulphide added be too concentrated, a cloudiness is produced at once, and in this case the test is useless, and must be discarded.

The following statement of results shows how closely these methods of estimation agree:

Lead found by the three Processes.

Sample.	Chromate	Sulphate.	Colorimetric.
	Per cent.	Per cent.	Per cent.
1. Metallic zinc, granulated . .	0·879	0·897	0·9
2. Ditto "Arsenic free" . . .	0·0372	0·0347	0·036
3. Zinc oxide	0·203 0·206	0·2001 0·1987	0·2
4. Ditto	0·1185 0·125	0·111 0·121	0·12
5. Zinc carbonate, commercial .	0·1069	0·1031	0·1
6. Zinc sulphate, commercial . .	0·0032	0·003	0·003

HCl must not be used for dissolving the substance. Acetic acid should be used wherever possible, and metallic zinc should be dissolved in HNO_3.

If ZnO be dissolved in HCl, and the solution made alkaline with AmOH, an opalescence, varying under certain conditions to a white precipitate, will be noticed. This is a basic chloride of lead $PbCl_2,3PbO,4H_2O$.

Lead has been found in zinc to the extent of 0·4 to 1 6 per cent. in the ordinary commercial metal, and 0 016 to 0·1 per cent. in the purified "arsenic-free" metal

The large proportion of lead which occurs in much of the ZnO of commerce is perhaps somewhat remarkable, but it is no doubt due to the fact that it is made from the metal which contains 0·4 to 1·6 per cent. In 32 samples examined vary from 0 05 to 0·4 per cent. (calculated as Pb). Needless to say, zinc salts also contain lead. The acetate, carbonate, chloride, sulphate and valerate have all been examined and found to be contaminated as follows:—Zinc acetate, 0 001 to 0·1 per cent.; carbonate, 0·04 to 0·14 per cent.; chloride, 0 02 to 0·04 per cent.; sulphate, 0·0002 to 0 02 per cent.; valerate, 0 002 to 0 003 per cent.

Lecithins, Vegetable. — Winterstein and Hiestand (*Zeits. Physiolog. Chem.*, **48,** 407; *Journ. Pharm. Chim.* [6], **24,** 126.) The authors confirm the statement of Schultze and Frankfort that the lecithin from cereals contains markedly less phosphorus (2 per cent.) than that extracted from leguminous seeds. These vegetable lecithins afford, when hydrolized, a considerable amount of saccharine matter in addition to the usual products of hydrolysis. Similar lecithins have been obtained from pine-tree pollen and alder pollen, also from chestnut leaves and the leaves of grasses. This accords with the hypothesis of Hoppe Seyler that chlorophyll is a complex lecithin. Cereal lecithins are not pure, but compounds of lecithin with carbo-hydrates, and it is proposed to abandon the name lecithin for these plant bodies, substituting the title, phosphatide, the name given by Thudichum for phosphorized bodies from brain substance.

Lemon, Abnormal Characters of this Season's, Essential Oil of. (*Schimmels' Report, April,* **1907,** 50.) The lemon oil produced during the recent season has had an abnormally high citral

content with a low specific gravity, and a very low optical rotation. The a_D of the present season's oil is so low that the requirements of the U.S.P., the lowest limit of which is $+60°$ at 25°C., can hardly be met, and will not be attained as the crop progresses. All of this year's oils have a very poor solubility with a high citral content at the commencement of the season which occasioned much trouble ; as the fruit ripened, however, the solubility improved.

Lemon Juice, Fresh, Clarified, and Sicilian. (*Journ. Pharm. Chim.* [6], **24,** 28.) *Fresh lemon juice* had the sp. gr. 1·047, and contained :—Dry extractive, 9·207 ; citric acid, 7·180 ; ash, 0·112 ; P_2O_5, 0·039 per cent.

Clarified lemon-juice, after 3 months' subsidence, gave the following figures :—Sp. gr., 1·037 ; dry extractive, 9·104 ; citric acid, 7·090 ; ash, 0·409 ; P_2O_5, 0·038 per cent.

Sicilian lemon-juice :—Sp. gr., 1·028 ; dry extractive, 7·750 ; citric acid, 5·950 ; ash, 0·380 ; P_2O_5, 0·028 per cent. The poor quality of the Sicilian juice is attributed partly to the fact that lower grade lemons are used locally than those exported ; and partly because the exported lemons lose moisture to a considerable extent during transport.

Lemon Grass, Essential Oil of, from Cochin-China. (*Schimmels' Report, Oct.* **1906,** 45.) A specimen of lemon grass oil distilled in the Government laboratory at Saigon, had the following characters :—Sp. gr., 0·8917 at 15°C. ; $a_D - 0°\ 10'$; aldehyde, 82 per cent. ; insoluble in 10 vols. of 70 per cent. alcohol ; soluble in 0·9 in 1 of 80 per cent. alcohol, but turbid with more solvent ; it behaves similarly with alcohol 90 per cent. It therefore resembles West Indian and African lemon grass oil, and has a lower value than the East Indian oil owing to its insolubility.

Lemon Grass, West Indian, Essential Oil of. J. C. Umney and C. T. Bennett. (*Chem. and Drugg.*, **70,** 138.) The sample examined had the sp. gr. 0·879 ; aldehydes, 75 per cent. by absorption method ; sp. gr. of non-aldehydes, 0·863 ; insoluble in alcohol 70 per cent. On fractionating at normal atmospheric pressure a considerable amount of the West Indian oil distils at, or below, 210°C., whereas the East Indian oil does not give any distillate below 220°C. When distilled under reduced pressure the first 20 per cent. of West Indian oil which is optically

inactive, has the sp. gr. 0·821. With East Indian oil under similar conditions, the first 20 per cent. has the a_D – 12° and the sp. gr. 0·882. None of the subsequent fractions of West Indian oil show optical activity, and all the similar fractions of East Indian oil are laevo-rotatory. The authors question the accuracy of assuming, as is customary, that the whole of the diminution in volume obtained by the hot absorption method with bisulphite, is due to citral. The length of time allowed for the process is found to modify the results, and concordant figures can only be obtained by limiting the action to one hour. When lemon grass oil is adulterated with citronella oil, the bisulphite compound is very difficult to dissolve, 3 to 4 hours sometimes being necessary for its complete decomposition, so as to obtain a clear non-aldehydic proportion for reading off.

Levulose and other Sugars, Meta-dinitro-benzene as a Reagent for. — Chavassieu and — Morel. (*Nouveaux Remèdes*, 23, 174.) Twenty c.c. of a 1 : 100 solution of *levulose* gives an intense violet colour reaction with 10 c.c. of alkaline meta-dinitrobenzene reagent in 2 minutes, and a 1 : 1,000 solution in 10 minutes. The reagent is prepared by dissolving meta-dinitrobenzene 1 Gm. in alcohol 100 c.c., and adding 35 c.c. of a 33 per cent. solution of NaOH thereto. Ten c.c. of this reagent is used for 20 c.c. of the sugar solutions. Under similar conditions *glycogen* and *saccharose* give no reaction; *maltose*, *lactose dextrose*, *galactose*, and *arabinose* give a violet colour in 15 minutes with 1 : 100 solutions, but not until 2½ hours with 1 : 1,000 dilutions. *Aldehydes* and *ketones* give a ruby red colour with the reagent; *albumins, albumoses, amide acids, urea* and *creatinine* a yellow colour; *uric acid* gives the same reaction as the aldoses. The reaction is valuable in rendering the presence of levulose evident in a mixture of other sugars or organic substances which often accompany it.

Licorice, Compound Powder of, Determination of Sulphur in F. H. Alcock. (*Pharm. Journ.* [4], 23, 485.) One Gm. of the powder with 50 c.c. of half B.P. strength HNO_3 and 5 Gm. KNO_3 are warmed gently together. Oxidation is slow and sure, and the sulphur does not fuse into small masses. When complete, 50 c.c. of half B.P. strength HCl is added, and evaporation conducted to dryness. The mass is then boiled with 10 c.c. half strength HCl and 20 c.c. of water and filtered, and the insoluble portion washed until free from sulphate. The volume

is made up to 200 c.c., raised to near the boiling point, and solution of barium chloride added drop by drop until in excess and no further precipitation occurs; collect, wash, dry, ignite, and weigh the resulting barium sulphate.

Commercial specimens examined by this process were found to be very variable in the quantity of sulphur, 7·1 per cent., 8·1 per cent., 9·25 per cent., and one sample gave varying results, although taken from the same bottle on different occasions. This was shown to be due to the fact that a good shake of the bottle is necessary to ensure uniformity of composition.

Experiments show that the other ingredients of compound licorice powder contain only a negligible amount of sulphur.

Lignaloe Oil and the Determination of Linalol. W. H. Simmons. (*Chem. and Drugg.*, **60,** 496.) Exception is taken to the statement of Parry and Bennett (*Chem. and Drugg.*, **58,** 544) that the percentage of linalol in the best lignaloe oils does not generally exceed 70 per cent., and that oils containing as much as 90 per cent. are abnormal. The low yield found, according to the author, is due to the method of acetylizing. Pure linalol when treated by the ordinary method for 1 hour only gave an acetyl value equivalent to 67·7 or 68·5 of linalol, and when treated for 2½ hours only 22·7 per cent. The method of V. Brulez (*Chem. Zeit. Repert.*, **1907, 31,** 58), however, gives nearly theoretical results.

It consists, briefly, in diluting 5 Gm. of the oil with 25 Gm. of turpentine, and boiling with 40 Gm. of acetic anhydride and 3 to 4 Gm. of fused sodium acetate for 3 hours, then washing, drying, and saponifying with potash in the ordinary way, a blank experiment with the turpentine being carried out at the same time. By allowing for the "alcohol value" of the turpentine, that of the oil under examination can be readily calculated.

Lignaloe oil, which only showed 68·5 per cent. of linalol by the old method, gave 88 per cent. when treated by Brulez's modification. The statement of text books that lignaloe oil contains about 90 per cent. of linalol is correct.

Lignin, Detection of, in Paper by Means of Para-nitraniline. A. Bergé. (*Merck's Jahresberichte*, **20,** 198.) A solution of 0·2 Gm. of para-nitraniline in a mixture H_2SO_4 20 Gm., water 80 Gm. is a sensitive reagent for the presence of lignin

in paper, with which it gives a light yellow to bright red colour according to the amount of wood pulp present.

Linaria vulgaris, Some Constituents of. T. Klobb and A. Fandre. (*Bull. Soc. Chim.*, **35,** 1240.) The flowers, as well as the herb free from roots, contains among other bodies extracted by light petroleum ether, a saturated hydrocarbon of high molecular weight, crystallizing from ether by slow evaporation in shining lamellae, m.p., 57°C. To isolate it, the petroleum ether extract, after distilling off the solvent, was treated while warm with acetone. The precipitate thus obtained was partially purified by re-solution in warm acetone, from which it separated on cooling. It was finally purified by recrystallization from ether. The acetone solution was found to contain a body giving reactions of a phytosterol. After the above extraction the flowers were extracted with boiling alcohol; this removed mannite, reducing sugars and linarin, $C_{14}H_{16}O_7$ which is identical with the linaric acid of Schlagdenhauffen and Reeb. Linarin is deposited as the alcoholic extract cools; the liquid is decanted while still warm, and the precipitate washed with boiling alcohol, in which it is nearly insoluble, and finally recrystallized from glacial acetic acid from which it is slowly deposited in the form of a silky powder, composed of microscopic needles, m.p. not sharp, 255°C. on slow heating; quickly heated it melts at 265°C. It has no acid function, but is probably a phenol. When oxidized it yields a volatile odorous body, linarodin, $C_9H_{10}O_2$, crystallizing in rhombic leaflets which unite to form lozenge-shaped crystals, m.p. 36 5. It is best obtained by distilling linarin with Fehling's solution and shaking out the distillate with ether. When melted, it remains for a long period in a state of superfusion. It sublimes at slightly above its melting point. Its odour is pleasant, resembling that of coumarin, when first prepared, but when quite pure it is odourless when cold, developing the characteristic aroma when heated. It is neutral, insoluble in alkalies, reduces ammoniacal silver nitrate, and gives no colour with Fe_2Cl_6. It appears to be neither an acid, an aldehyde, nor a phenol.

Linseed, Absence of Starch from. G. Rusting. (*Annales de Pharm. de Louvain* through *Répertoire* [3], **19,** 122.) No starch has been detected in any sample of pure linseed, or of

genuine oil-cake, examined. Ranwez confirms the statement that flax seed contains no starch, although the cellular membrane of certain tissues of the seed give a blue colour with iodine; this is not due to the presence of starch grains. The starch which is frequently met with in commercial linseed meal and oil-cake is derived from the foreign seeds which are mixed in greater or less quantity with the flax seed.

Lolium temulentum, Toxicity of, due to a Fungus. E. Hannig. (*Apoth. Zeit.*, 22, 171.) Darnel grass seed has been shown (*Year-Books*, **1891**, 179; **1893**, 157) to contain a poisonous base. It is found by the author that this is only present in plants infected with a parasitic fungus. Such plants are almost universal on the Continent; but in the neighbourhood of Prague and Strasburg it is occasionally met with without this parasitic growth; and around Cambridge in England the plant is common which has no fungoid infection. The seeds of these plants contain no "temuline" and are quite free from poisonous properties.

Malt Extract, Determination of Nitrogen in. F. H. Alcock. (*Pharm. Journ.* [4], **24**, 205.) The following method prevents the troublesome frothing which is apt to lead to loss in conducting the N-determination by the ordinary Kjeldahl method.

Fifty c.c. of the liquid used for ascertaining the percentage of total solids in the extract by the sp. gr. process (see *Year-Book*, **1906**, 278) is placed in a litre Jena glass flask on a water-bath or hot iron plate, and the sulphuric acid is added from a pipette or burette, 10 c.c. at a time, with occasional gentle agitation, continuing this at suitable intervals (5 to 10 minutes) until the liquid turns black and begins to froth. It is found that between the addition of the 30 c.c. and the 40 c.c. is the time when close attention is required; the fifth 10 c.c. may be added all at once, and the flask and contents then settle down and can be transferred to the fume chamber. If the mass appears dry, 10 to 20 c.c. more may be added with advantage, and the process continued in the usual way, adding the 10 Gm. of K_2SO_4 when judged convenient. When the liquid becomes colourless—which in this operation is a lengthy process—proceed as directed in *Year-Book*, **1906**, 284. The nitrogen content of commercial malt extracts varies very considerably.

Mandelonitrile Glucosides, Prulaurasin and Sambunigrin, Relationship between. R. J. Caldwell and S. L. Courtauld. (*Proc. Chem. Soc.*, **23,** 71.) When the mandelonitrile glucoside obtained by hydrolizing amygdalin with N/HCl is treated with alkalies it is converted in prulaurasin. Amygdonitrile glucoside therefore bears the same relationship to prulaurasin as amygdalin bears to isoamygdalin, which is the derivative of inactive mandelonitrile, while amygdalin and Fischers' glucoside are derived from laevo-mandelonitrile. As the a_D of prulaurasin is intermediate between that of Fischers' glucoside and that of sambunigrin, the latter must be regarded as the β-glucoside of dextro-mandelonitrile.

Mannite, Test for the Purity of. O. Carletti. (*Boll. Chim. Pharm.*, **1907,** 5, through *Schweiz. Woch.*, **45,** 145.) Mannite is distinguished from other carbohydrates by the fact that it does not give furfural when treated with strong H_2SO_4. In consequence, the presence of saccharose, glucose, and other sugars as adulterants may be detected by the following test. A few c.c. of strong H_2SO_4 are mixed in a test-tube with a few drops of a 1 : 100 solution of menthol, thymol, naphthol, or other phenolic body. A light yellow coloured solution is thus obtained. A little of a 2 : 100 solution of the mannite to be tested is cautiously floated on the surface of this mixture. In the presence of other carbohydrates giving rise to the formation of furfural, a rose to violet coloured ring will be obtained.

Maretine, Reactions of. P. Lemaire. (*Répertoire* [3], **19,** 49.) When heated in a dry tube, maretine evolves NH_3, and the brown residue, taken up with a few c.c. of alcohol, gives a carmine red colour with excess of NaOH ; another portion of the same, when treated with $HgCl_2$ gives a violet colour. When maretine is treated with HNO_3 it dissolves with a yellow colour ; on warming nitrous fumes are evolved. On adding water to the solution a precipitate is formed and the odour of nitrobenzol is evident. The same odour is produced on heating maretine with sodium hypobromite. When it is heated with H_2SO_4 in presence of formalin a carmine-red colour is formed. On adding 1 or 2 drops of a 1 per cent. solution of $KClO_3$ to 2 c.c. of H_2SO_4 containing a little maretine, a reddish-brown colour is produced; other oxidizing agents give more or less similar colours. With aqueous solutions of maretine bromine solution forms a precipitate

on warming; sodium nitroprusside in presence of acetic acid gives a green colour. A precipitate is formed in aqueous solution of maretine by adding a mixture of 5 drops of HCl in 1 c.c. of a 1 per cent. solution of $NaNO_2$. An intense blue colour is produced by adding a few drops of the solution to 2 c.c. of ammonium molybdate solution 10 per cent., and 2 or 3 drops of acetic acid, and heating. Maretine solutions are coloured yellow by alkalies, and the mixture evolves NH_3 on warming. They reduce Fehling's solution, $AgNO_3$ solution, and other reducible reagents. Maretine liberates I from dilute HI. An immediate precipitate of Prussian blue is given with $K_6Fe_2Cy_{12}$ and a trace of Fe_2Cl_6. A little $CuSO_4$ solution, heated with maretine solution gives a reddish-violet colour; with 4 or 5 drops of $Hg2NO_3$ an immediate yellow precipitate is formed, which dissolves on warming, then the solution reddens and forms a red-brown precipitate. A solution of maretine in HCl when heated for some time with 1 c.c. of H_2O_2 gives at first a yellow, then a carmine-red solution. A similar solution treated with furfural in alcohol becomes yellow; on heating it turns orange-red, then brownish-violet.

Meat Extract, Creatine and Creatinine, Colorimetric Determination of. E. B. Baur and — Barschall. (*Arb. Kaisl. Gesinid. Analyst*, **32**, 48.) Jaffé has shown that when a mixture of creatinine solution and picric acid is rendered alkaline, it gives an intense red colour, reaching a maximum in 5 minutes and slowly fading in a bright light. It can easily be matched with $K_2Cr_2O_7$ solution; and within the limits of 8 to 16 Mgm. of creatinine in 500 c.c. is quite proportional to the concentration. Ten Gm. of the meat extract is dissolved in water and made up to 100 c.c. Ten c.c. of the solution is mixed with 15 c.c. of saturated picric acid solution and 5 c.c. of 10 per cent. NaOH solution. After 5 minutes the solution is diluted to 500 c.c. and compared with $N/K_2Cr_2O_7$ solution (24·54 Gm. to 1,000 c.c.). The colour shown through 8 Mm. of the solution is equal to that of 10 Mgm. of creatinine. Another 10 Gm. of the extract is dissolved in N/3HCl, sufficient to give 100 c.c. of liquid and heated for 4 hours on the water-bath. The creatine is thus converted into creatinine, the total amount of which is determined colorimetrically as before. The difference between the two numbers $\times$ 1·32 gives the amount of creatine. By this method Liebig's extract gives 1·25 per cent. of creatine and 3 0 per cent. of creatinine. Other meat extracts examined

gave much less of both. Yeast extract gave no indication of the presence of either.

Meat Extract, Determination of Creatin and Creatinine in. O. Hehner. (*Pharm. Journ.* [4], **24,** 683.) Grindley and Woods (*Journ. Biolog. Chem.*, **2,** No. 4) thus modify Baur and Barschall's test. Fifteen c.c. of saturated picric acid solution and 5 c.c. of 10 per cent. NaOH solution are added to the solution to be tested for creatinine, the volume of which should not exceed 10 c.c. After standing for at least 5 minutes the solution is diluted to a suitable bulk and its colour compared with that obtained with a standard solution of creatinine with the same quantities of reagents. Creatine gives no colour. On heating the solution for at least 4 hours with N/3HCl the creatine is converted into creatinine and then reacts as above.

Baur and Barschall direct that 10 Gm. of the meat extract are to be heated in this way with HCl, and the solution made up to 100 c.c.; 10 c.c. (=1 Gm. of original extract) is then to be treated with 15 c.c. of picric acid solution and 5 c.c. of 10 per cent. NaOH solution. But the author finds that this amount of picric acid is insufficient and that consequently the results obtained by the above-named chemists are too low. In the same brand of extract in which Baur and Barschall found 4·25 of creatine plus creatinine, and Grindley and Woods only 1·38 to 6·56 per cent., the author finds from 10·2 to 12·2 per cent.

When the author tests these samples, using only 15 c.c. picric acid to 1 Gm. of extract, a coloration is obtained matched by from 6 per cent. to 7 per cent. of (acid-treated) creatine, whilst when using 25 c.c. of picric acid solution, or more, a deeper colour, which cannot be increased by further additions of picric acid, is obtained, and which matches against from 10 per cent. to 11 per cent. of creatine. While Grindley and Woods' figures, and still more so those of Baur and Barschall, are valueless as regards meat extracts, they are quite correct and in accordance with the results of previous investigators as regards meat itself, because, to test meat, they employed only quite minute quantities, for which the picric acid used was amply sufficient. In beef Grindley and Woods found 0·41 per cent. of creatine. As beef, in round figures, gives $\frac{1}{25}$ of its weight of meat extract, it would follow that the beef tested by them should have yielded an extract with 10·8 per cent. of creatine, which is absolutely in accordance with the author's results.

Marjoram, Essential Oil of, Terpineol of. O. Wallach and F. Boedeker. (*Berichte*, **40,** 596.) Marjoram oil contains an alcohol, $C_{10}H_{17}OH$, with a terpineol identical with that found in cardamon oil. By cautious oxidation with $KMnO_4$ it forms the glycerol $C_{10}H_{17}(OH)_3$, which crystallizes from $CHCl_3$ solution. By further oxidation an acid $C_{10}H_{18}O_6$, sparingly soluble in cold water, is obtained. This occurs in two modifications, one with the m.p. 205–206°C., the other m.p. 188–189°C. Both these are converted by heat or by reagents into a crystalline lactone, $C_{10}H_{14}O_4$, which is volatilized by steam and which is reconverted into the acid by boiling with KOH.

Melaleuca linariifolia, Essential Oil of. (*Schimmels' Report, October*, **1906,** 14.) The oil from this Australian plant is colourless, with a peculiar aromatic odour. Sp. gr. 0·9109 ; a_D+3° ; soluble 1 : 1·5 and more of alcohol 80 per cent., but opalescent with 1 : 3. It contains cineol and an aldehyde, probably citronellal.

Melaleuca thymifolia and M. linariifolia, Essential Oil of. R. T. Baker and H. G. Smith. (*Proc. Linn. Soc., N.S.W.*, **40,** 60 ; *Schimmels' Report, April*, **1907,** 14.) *Melaleuca thymifolia* leaves distilled in April gave a yield of 2·28 of pale yellow essential oil resembling eucalyptus oil rich in cineol, but less soluble. Sp. gr. 0 9134 ; a_D+2° 1′ ; $\eta_{D23°}$, 1,4665 ; saponification value, 3 1 ; acetyl value, 33 6 ; insoluble in alcohol 70 per cent. ; soluble 2 : 1 in 80 per cent. alcohol, cloudy with more. It gave 53 per cent. of cineol by the H_3PO_4 method, and contains traces of aldehydes, but no pinene nor phellandrene. The alcohol appears to be closely allied to borneol.

Melaleuca linariifolia leaves, distilled in September, gave 1·214 per cent. of pale yellow oil with an odour of turpentine. Sp. gr. 0·9129 at 15°C. ; a_D+2·5 ; $\eta_{D22°}$, 1·4741 ; saponification value, 6 4 ; acetyl value, 40·3 ; insoluble in alcohol, 70 per cent., soluble 1 : 1 in 80 per cent. alcohol, slightly turbid with more. It contains neither pinene nor phellandrene, and but little cineol ; small amounts of aldehydes are present. The alcohol present appears to be identical with that in the oil of *M. thymifolia.*

Mentha rotundifolia, Essential Oil of. (*Schimmels' Report, April*, **1907,** 107.) The oil, distilled in Algeria, had the sp.

gr., 0·9777 at 15°C.; α_D −37° 30′; acid value, 1·5; ester value, 71·2; acetyl value, 209; very soluble in alcohol, 90, with 80 per cent. alcohol soluble 1 : 1, but throwing out on further dilution with the solvent. The odour of the oil was flat, musty, somewhat pungent, and distantly resembled that of spearmint oil.

Mentha viridis, Russian, Essential Oil of. (*Schimmels' Report, October*, **1906,** 73.) Russian spearmint oil has a lower sp. gr. than German or American oil, contains more linalol and less carvone. The odour value is not equal to that of the other oils. Two specimens of Russian oil recently examined had the following characters:—Sp. gr. 0 8873 and 0·8884 at 15 C.; a^D −25° 16′ and −25° 20′; $\eta^D_{20°}$. 1,47078 and 1,47088; acid value, 1·1 and 0·0; ester value, 15·9 and 15·1; soluble in alcohol 80 per cent., 1 : 1.

Mercury, Determination of, in Galenical Preparations. E. Rupp. (*Archiv. Pharm.*, **244,** 536.) *Mercurial Plaster.* Three Gm. of the plaster cut into small pieces is heated on the water-bath for 10 minutes with 20 c.c. of pure HNO_3, covering the mouth of the flask with a small dish filled with water. When the Hg is dissolved 25 c.c. of water is added and the mixture is heated to cause the fat to rise. The liquid is allowed to cool, and is then decanted from the solid cake of fat. This is then broken up and washed 3 or 4 times with water; the bulked acid liquid is then made up to about 75 c.c., and completely oxidized by the gradual addition of $KMnO_4$ solution, excess of the latter being removed by a little $FeSO_4$ solution. The solution is then made up to 100 c.c., filtered, and titrated with N/10 KCNS solution, using iron alum indicator; each c.c. of solution used before the production of the red colour =0 01 Gm. Hg. *Mercurial Ointment* may be assayed in the same way. *Red Oxide of Mercury Ointment* is exhausted of its mercury by means of 25 c.c. of 25 per cent. nitric acid to 5 Gm. of ointment. The further treatment is the same. Each c.c. of N/10 KCNS indicates 0 0108 Gm. of mercuric oxide. *White Precipitate Ointment.*—Remove the mercury by digesting 5 Gm. with 25 c.c. of dilute HCl; wash and make up to 100 c.c. Transfer 25 c.c. to a stoppered bottle, add 0·5 to 1 0 Gm. of KI, then 15–20 c.c. of KOH solution, and finally 2–3 c.c. of formaldehyde and 10 c.c. of water. Reduction of the mercuric salt is instantly effected. Acidify with 25 c.c. of acetic acid, add 20 c.c. N/10 I solution, shake until the

mercury is dissolved, and titrate back with thiosulphate. Each c.c. of N/10 I solution used indicates 0·01257 Gm. of white precipitate. *Pastilles of Mercuric Chloride.*—Dissolve pastilles equivalent to 1·0 Gm. of mercuric chloride in 500 c.c. of water. Take 20 c.c. of this solution and treat as in the foregoing with KI, etc. Each c.c. of decinormal iodine indicates 0·01355 Gm. of $HgCl_2$. *Mercuric Chloride Gauzes, etc.*—Determination of the soluble mercury : Macerate 20 Gm. with 500 c.c. of water for 2 hours, stirring frequently ; filter ; to 250 c.c. of the filtrate add 1 Gm. of KI and 10 c.c. of NaOH solution, then add 3 c.c. of formaldehyde and 10 c.c. of water. After 5 minutes add 25 c.c. of acetic acid, 5 c.c. of N/10 I solution, and 5 c.c. of chloroform. As soon as the mercury has entirely dissolved titrate the excess of iodine with centinormal thiosulphate. Each c.c. of N/10 iodine solution absorbed indicates 0·1355 per cent. of $HgCl_2$.

Mercuric Oxide, Yellow. J. Beddall Smith. (*Pharm. Journ.* [4], 24, 129.) It is suggested that a definite limit 0·1 per cent. for non-volatile matter on heating should be officially adopted. In samples examined this has ranged from 0·83 to 1·66 per cent. ; in the latter the oxide could not yield the official quantity of mercury. Of 10 specimens examined only 1 gave less than 0·5 per cent. of ash.

Merzemia filicifolia, Cyanogenetic Glucoside in. Wechnizen (*Pharm. Post,* **1906,** 834 ; *Pharm. Centralh.*, **48,** **364.**) The fresh leaves of this convolvulaceous plant when crushed and digested at 35–40°C. for 8 hours yield 0·04 per cent. of HCN. If the leaves are first dipped for an instant in boiling water, no HCN is subsequently obtained. *Merzemia filicifolia* is therefore an addition to the list of plants containing cyanogenetic glucosides.

Methyl-anthraquinones, Microchemical Detection of, in Crude Drugs. W. Mitlacher. (*Pharm. Zeit.*, **51,** 1084.) Emodin or methyl-anthraquinones may be detected by heating a small quantity of the powdered drug in a watch glass, covered by a micro-slide, on a sand-bath. A sublimate is thus obtained which consists of crystalline yellowish needles, sometimes 1 mm. long. They are birefringent, soluble in most organic solvents, and coloured an intense red by alcoholic KOH, and are slowly dissolved by aqueous NaOH with the production of a similar colour. Where an indistinctly crystalline sublimate results,

well-formed crystals may generally be obtained by resubliming, Thus, from cascara bark, the first sublimate generally forms yellow crystalline irregular masses; in the case of senna these are rounded. Both these give good crystals on resubliming. Rhubarb or frangula give a good sublimate at first.

Milk and Cream, Test for Sucrose in. W. H. Anderson. (*Analyst*, **32**, 87.) Cayaux's test for sucrose answers well for detecting that sugar in milk or cream. Fifteen c.c. of the milk is treated with 0·1 Gm. of resorcinol and 1 c.c. of strong HCl and heated to boiling. In the presence of cane sugar a fine red colour is formed; pure milk only gives a brownish tinge on continued boiling. The reaction will detect 0·2 per cent. of added cane sugar.

Milk, Detection of Formalin in. F. H. Alcock. (*Pharm. Journ.* [4], **23**, 28.) To 2 c.c. of the milk add an equal volume of a 20 per cent. solution of KOH, shaking vigorously; then add an excess of strong HCl, and warm gently. A coagulum is the result, which becomes more or less deeply tinted of a violet colour, according to the quantity of formalin present in the milk. The liquid below the coagulum is colourless and only slightly turbid, but gradually acquires the colour of the coagulum, which persists for many days. In order to ascertain the delicacy of the test, one drop of commercial formalin was added to a pint of fresh milk previously shown to be free from formalin, shaken well, and then 1 c.c. of milk tested as above. A distinct violet colour resulted, and this persisted for several days.

A variation of the method gives even more marked results. One c.c. of the same milk mixed with 1 c.c. of water and 1 c.c. of B.P.HCl. was warmed; then a few drops of the solution of KOH were added, when an intense violet colour appeared, but quickly disappeared to the usual pale violet colour.

Milk, Detection of Sodium Bicarbonate in. F. Lelli. (*Gazz. Chim. Ital.*; *Répertoire* [3], **19**, 40.) To 10 c.c. of milk add an equal volume of water and 10 Cgm. of aspirine; heat on the water-bath to 60°C. for 10 to 20 minutes. Normal milk will curdle, and the casein will collect in the upper part of the tube, leaving the serum clear. If $NaHCO_3$ is present, the liquid remains opaque, or turbid. If it be now filtered and 8 or 10 drops of Fe_2Cl_6 be added to the filtrate, with pure milk no reaction will be obtained, but in the presence of $NaHCO_3$ an abundant reddish-yellow precipitate will be formed.

Milk, for Analysis, Mercuric Chloride as a Preservative of. P. Grelot. (*Journ. Pharm. Chim.* [6], **25,** 432.) The author has shown that potassium bichromate used in France to preserve samples seized for the purpose of analysis, is not satisfactory for the purpose (*Journ. Pharm. Chim.* [6], **25,** 369.) Chloroform was also tried, but found to be unsatisfactory; sterilizing was found to modify the characters of the milk. The addition of other preservatives would render nugatory any tests for these in the sample. Of all the preservatives tried, $HgCl_2$, in the proportion of 5 Cgm. to each 250 c.c. of milk was found to be most satisfactory, enabling the sample to be kept for 10 days in a normal state, and not materially affecting the chemical or physical "constants." To increase the solubility of the $HgCl_2$ one-fourth its weight of AmCl was also added. For convenience, a compressed tablet containing $HgCl_2 = 5$ Cgm., AmCl 0 0125 Gm. is recommended. One of these is dropped into each 250 c.c. sample when taken.

Milk, Sterilized, Compressed Tablets for Testing. — Bruère. (*Journ. Pharm. Chim.* [6], **24,** 488.) *Tablet No.* 1. Crystallized guaiacol, 10 Gm.; powdered milk sugar, dried at 100°C. 40 Gm. Mix intimately and compress into 200 tablets.

Tablet No. 2.—Anhydrous sodium perborate in powder, 50 Gm. Compress into 200 tablets.

To test milk, a No. 1 tablet is crushed and introduced into a test tube with 5 c.c. of water; 10 c.c. of milk is then added and the mixture agitated. Normal milk remains colourless. A No. 2 tablet is crushed and added. Milk which has been pasteurized at 80°C. or boiled remains colourless. Fresh raw milk gives an immediate salmon pink colour, increasing to pomegranate red. Stale milk gives this colour reaction more slowly, and if several days old will not produce it at all, so that it might pass for sterilized milk by this test. This is due to the inhibitory action of lactic acid. In doubtful cases of this nature, the milk is first treated with a tablet of 0·25 Gm. of sodium bicarbonate dissolved in 3 c.c. of water. If the milk is stale and unsterilized it will then give the salmon pink reaction on treating as before with tablets No. 1 and No. 2. The presence of ordinary preservatives, except hydrogen peroxide, does not affect the results. Fresh milk containing hydrogen peroxide gives the salmon colour reaction with tablet No. 1 alone. The presence of vegetable ferments such as are derived from macerating bran or flour in

the milk, is detected by the production of an orange colour, deepening to brown with tablets No. 1 and No. 2 together.

Morphine, Quantitative Method of Extraction. T. Tickle. (*Pharm. Journ.* [4], **24**, 162.) Use is made an of immiscible solvent composed of coal-tar cresol, recently distilled, 2 parts, and amyl alcohol 1 part, which is employed in the usual manner for shaking out the liberated alkaloid. For the general process of isolating the morphine contained in 100 c.c. of aqueous solution, add sodium bicarbonate to liberate the alkaloid; agitate with a mixture of pure or recently distilled cresol, 2 parts, with amyl alcohol, 1 part, using for the first and second fractions 10 c.c., and for the third and fourth fractions 5 c.c. Mix the four fractions, add 15 c.c. of ether. Filter through thick dry paper, recording the loss. Then add 30 c.c. of petroleum ether and shake with a 1 per cent. solution of acetic acid, using 10 c.c. for the first fraction and 5 c.c. for succeeding fractions, until a little, when evaporated to dryness on a watch-glass, exhibits no residue.

Mix the portions of acetic acid and evaporate to dryness.

This process, allowing of the concentration of the product to any desired degree, is serviceable for dilute solutions of morphine, and is especially useful in toxicological investigations, as the cresol fixes and eliminates the albuminoid extractive material, which otherwise often occasions considerable difficulty.

When the quantity of morphine is so small that it is difficult to gauge the amount of ammonia required for its precipitation, the following procedure is useful: To the residue of morphine acetate contained in a shallow dish or watch-glass is added the required quantity of water, which may be estimated from the weight of residue. A strength of one in ten is convenient. When solution is complete the dish is placed in a covered vessel, such as a desiccator jar, side by side with a beaker containing very dilute ammonia. The morphine solution rapidly absorbs ammonia vapour, and the alkaloid slowly separates in relatively large crystals convenient for manipulation. By using ammonia sufficiently weak, in this manner, the quantity becomes unimportant, and there is no danger of introducing excess, in which the alkaloid is considerably more soluble than in water. A solution, smelling perceptibly of ammonia, is strong enough.

The crystals are then transferred to a porous tile to be dried, and may be rendered anhydrous at 110°C. and weighed.

Larger quantities, up to 0·2 Gm., may be treated in the same

way, the solution being placed in a sufficiently shallow dish and left 12 hours. If the quantity is sufficient it may be estimated by titration. As the well-crystallized product is but slowly soluble in dilute standard acid it is best dissolved in a measured quantity forming excess, the excess of acid being measured by standard soda and deducted; or the crystals may be dissolved in hot alcohol, the solution poured into water and titrated immediately.

When, as is usually the case, the purity of the product is strongly characterized by the appearance of the crystals, there is little to be gained in accuracy or expedition by titration. Well-crystallized morphine gives very accurate results by weighing the air-dried substance, which consists of the mono-hydrated base.

The following experiments are of interest:—

An aqueous solution, measuring 100 c.c. and containing 0·1 Gm. of morphine, was taken for each experiment. It was made alkaline, and agitated with 30 c.c. of each of the following liquids in a single portion.

The numbers indicate the percentages of the alkaloid extracted by the respective solvents.

Ethyl acetate, 9·1; amylic alcohol, 31·6; phenol, 37·0; *o*-cresol, 39·2; *m*-cresol, 40·2; *p*-cresol, 35 2.

An aqueous solution of morphine, containing 5 Gm. per litre, was made alkaline, and shaken with its own volume of the following liquids. The numbers, as before, give the percentages of the alkaloid transferred to the organic solvent.

Ethyl acetate, 32·0; amylic alcohol, 37·2; phenol, 69·2; *o*-cresol, 66·8; *p*-cresol, 68·8; *m*-cresol, 84·8; phenol, 1, 88·0; amylic alcohol, 2, 88 0; phenol, 2, 99.0; amylic alcohol, 1, 99·0; phenol, 1, 89·0; camphor, 1, 89 0; creosote, 91·0; eugenol, 32·0; clove oil, 71·0; cassia oil, 33·0; phenol, 1, 68 0; benzene, 1, 68·0; phenol, 1, 65·0; chloroform, 1, 65 0; cresol, 1, 49·0; ether, 1, 49 0.

The following liquids, which were tried under the same conditions, took up very small amounts, the quantities below being contained in 20 c.c.:—Chloroform (containing a little alcohol), 0·0075; carbon tetrachloride, 0·0006; benzene, imperceptible amount; nitrobenzene, 0·003; benzaldehyde, 0·006.

The behaviour of carbon tetrachloride in this respect is important; for, being a good solvent of alkaloids generally, its use is indicated for the separation of them from mixtures with

morphine, especially when the use of lime or caustic alkali for fixing the latter is impracticable.

Morphine, Separation of, from Solution in Glycerin. H. M. Gordin. (*Proc. Amer. Pharm. Assoc.*, **1906**, 374.) The solution of morphine in glycerin is treated with excess of N/ iodine solution, and the liquid is diluted with water to about 3 times its original volume. On standing overnight about 80 per cent. of the morphine present crystallizes out as morphine tri-iodide. This is collected, washed with water containing a little Wagner's reagent, and dissolved in a few c.c. of H_2SO_3 ; on adding a slight excess of K_2CO_3 to the solution and heating to 100°C. for a minute, the alkaloid crystallizes out when the solution cools.

Mosla japonica, Essential Oil of, Thymol Contents of. — Hada. (*Oriental Drugg.*, through *Pharm. Zeit.*, **52,** 202.) This Japanese plant, the essential oil of which contains 58 per cent. of thymol, has not occurred for many years. The author has rediscovered it in the district of Sanyo, and proposes to cultivate it as a commercial source of thymol.

Myrrh, Essential Oil of. K. Lewinsohn. (*Archiv. Pharm.*, **244,** 412.) A specimen of the oil prepared by the author was bright yellow, neutral, and had the sp. gr. 0·997 at 20°C., and 1·001 at 15°C; a_D −70° 25′ at 20°C. Three commercial samples examined were reddish-brown in colour, and more or less acid, the sp. gr. was about 1·014, and the a_D ranged from −40° 3′ to −69° 5′ at 18°C. The characters and constituents of myrrh oil vary with age and method of distillation. Three of the samples contained about 1 per cent. of cuminic aldehyde. A fair amount of eugenol and a little metacresol are also present; also penene, depentene and limonene; and two sesquiterpenes having the common formula $C_{15}H_{24}$. One has the sp. gr. 0·926 at 20°; a_D+22·75, and b.p. 163°C. under 12 mm. The other has the sp. gr. 0·911 at 21°C.; a_D+30° 4′; b.p. 151 under 15 mm. They have not been identified with any known sesquiterpenes, although one resembles cadinene. When myrrh oil has been kept it becomes acid and yields acetic and palmitic acids, due to the breaking down of esters.

Myrtle, Essential Oil of. F. W. Semmler and K. Bartelt. (*Berichte*, **40,** 1363.) The higher boiling fractions of myrtle oil contain the esters of an alcohol myrtenol, $C_{10}H_{16}O$. By treatment with chromic acid the aldehyde myrtenal $C_{10}H_{14}O$

is obtained, giving the oxime $C_{10}H_{15}ON$ with hydroxylamine. This oxime, when heated with acetic anhydride, yields the nitride $C_{10}H_{13}N$, which when saponified with alcoholic KOH, gives mytenic acid, m.p. 54°C., b.p. 148°C. The pleasant odour of myrtle oil is due to the alcohol myrtenol. (See also *Year-Books*, **1886,** 229; **1889,** 186; **1892,** 175.)

Nandina domestica and other Species, Hydrocyanic Acid in. J. Decker. (*Apoth. Zeit.*, **21,** 848.) Eykmann has previously isolated berberine and an amorphous alkaloid nandinine $C_{19}H_{19}NO_4$ from the rootbark of *Nandina domestica.* The fresh leaves of the plant are now found to yield notable quantities of prussic acid and acetone when distilled. The leaves of the white-fruited variety gave 0·26 per cent. of HCN; of the red-fruited variety 0·147 per cent.; of *N. major*, 0·074 per cent.; and of *N. angustifolia*, 0·070 per cent. The presence of HCN in plants belonging to the N.O. *Berberidaceae* is of interest. Many other members of the same order have been examined for this acid with negative results.

Nandina domestica is recognized as poisonous in Japan, where it is cultivated as an ornamental shrub. Its leaves are emetic, and the leaves and rootbark yield an extract which is considered to be a muscular tonic and a stimulator of intelligence. It is also recommended for rheumatism, gout, diarrhœa and spermatorrhœa.

Neatsfoot Oil. (*Southall's Report*, **1907,** 12.) But one specimen of this oil has been met with during the past twelve months giving the high iodine absorption value which used to characterize commercial oils.

	Normal (4 samples)	Impure Commercial
Saponification value	193·1 to 194·7 per cent	193·7
Iodine value . .	70·23 to 71·87 ,, ,,	95·26 per cent.

Nitrates, Detection of, in Alkali Iodides. E. Baroni. (*Boll. Chim. farm.*, **1906,** 529; *Journ. Pharm. Chim.* [6], **24,** 552.) One Gm. of the alkali iodide is treated with 20 c.c. of 5 per cent. of $HgCl_2$, added by degrees. The whole of the iodine is thus precipitated as HgI_2. This is filtered out and the filtrate is tested for nitrates in the usual manner with $FeSO_4$ crystals and H_2SO_4; or with a solution of diphenylamine sulphate.

"Official" Soaps, Presence of Coconut Fat in. R. A. Cripps. (*Pharm. Journ.* [4], **24, 519.**) Coconut oil is found to be used in the preparation of so-called Castile soap, in *Pulv. Sapo. dur. P.B.*,

in *Sapo durus B.P.*, and it is stated to be the custom of soap-boilers to use other oils than olive oil for making the "official" soaps. The most generally useful test is Reichert's butter test, for which 5 Gm. of the soap is dissolved in 100 c.c. of boiling water, 40 c.c. of approximately normal sulphuric acid added, together with 0·1 Gm. of powdered pumice, and distilled until 110 c.c. have collected; the distillate is filtered *clear*, and the filter washed once with water. One hundred c.c. of this distillate (without washing) is then titrated with N/10 NaOH, and should require less than 2 c.c. (usually about 1 c.c.) if pure. The condenser is now rinsed with 15 c.c. of *neutral* alcohol, and the alcohol passed through same filter; this filtrate on being neutralized as before should require 1 c.c. or less of N/10 NaOH. The first figure represents "soluble volatile acids," the second "insoluble volatile acids," and are given in table as "A" and "B" respectively. For the other tests the fatty acids are separated as usual.

TABLE OF ANALYTICAL RESULTS.

No	Description of Soap	Reichert A	Reichert B.	Fatty Acids. Melting Points.	Fatty Acids. Iodine Absorbed
1	Pulv. Saponis Dur., P.B.	4·7 c.c.	5 8 c.c.	22·5°	55·9 c.c
2	Pulv. Saponis Dur., P.B.	4·1 c.c.	5·5 c.c.	—	—
3	Pulv. Saponis Dur., P.B.	4·6 c.c.	6 6 c.c.	21·5°	57 8 c.c.
4	Pulv. Saponis (Castile)	4 8 c.c.	7·9 c.c.	—	—
5	Sapo Durus, P.B.	6 2 c.c.	9 0 c.c.	23 0°	43 9 c.c.
6	Sapo Durus, P.B.	1·45 c.c.	1·0 c.c.	27 0°	73·8 c.c.
7	Sapo Castile	5 4 c.c.	7·4 c.c.	22·0°	42 5 c.c.
8	Sapo Animalis, P.B.	0 8 c.c.	0·8 c.c.	—	—
9	Sapo Mollis, P.B..	1 3 c.c.	0·9 c.c.	29·5°	85 9 c.c.
10	Sapo Mollis, P.B..	1 6 c.c.	0·8 c.c.	25·5°	105 0 c.c
11	Sapo Mollis, P.B..	1 8 c.c.	0·3 c.c.	—	—
12	Sapo Mollis, P.B..	1·9 c.c.	0·4 c.c.	—	—
13	Sapo Mollis, P.B..	1 6 c.c.	0·2 c.c.	—	—
14	Acid Oleic, P.B.	0 45 c.c.	0·8 c.c.	—	—
15	Zinci Oleas, P.B.	4·8 c.c.	6·2 c.c.	24·0°	44·6c.c.

Ointments of Belladonna, Stramonium, or Henbane, Alkaloidal Assay of. C. E. Vanderkleed. (*Proc. Amer. Pharm. Assoc.*, **1906**, 422.) About 5 Gm. of the ointment is treated with 30 c.c. of ether; the clear ether solution is decanted into a separator and the insoluble residue is extracted with another portion of ether in the same manner. Reserve the insoluble residue and shake out the bulked ether solution with 30 c.c. of

5 per cent. H_2SO_4. Separate the acid liquid and reject the ether. Treat the insoluble ether-residue with another 30 c.c. of 5 per cent. H_2SO_4 and add the solution to the other acid, washing any suspended precipitate. Wash the residue with another 30 c.c. of 5 per cent. acid, transferring the insoluble matter as well as acid to the separator. Wash out the vessel which has contained the residue with ether and add this also to the other liquid. Shake out the bulked acid liquor twice in succession with ether and reject the ether, taking care not to remove any of the suspended precipitate. Add the acid liquid at first separated from the ether. Make the whole alkaline with AmOH. Shake out with three successive washings of $CHCl_3$; evaporate the solvent, dissolve the residue in N/10 H_2SO_4 and titrate back the excess of acid with N/100 KOH with iodeosin indicator.

Olive, Linseed, and other Oils, Examination of. R. T. Thomson and H. Dunlop. (*Analyst*, **31**, 281.) Wijs' method of determining the iodine value of oils having been found to be more trustworthy than that of Huebl, a fresh series of iodine values has been determined by this method with the oils enumerated below.

TABLE I.

Authentic Oils Extracted by the Authors.

	Iodine Value (Wijs)	Zeiss Refractometer at 25°C	Saponification Value Per cent	Unsaponifiable Matter Per cent	Specific Gravity, 60 F	Free Acid Per cent.
Olive oil (Spanish, green, by pressure) . . .	83·20	61·2	19·56	1·25	—	1·28
Olive oil (Spanish, green, by CS_2)	83·20	61·2	19·21	1·62	—	0·90
Olive oil (Spanish, ripe, by pressure) . . .	88·95	61·3	19·28	1·34	0·9156	0·51
Olive oil (Spanish, ripe, by CS_2)	88·15	62·2	19·14	1·52	—	0·36
Olive oil (Turkish, very ripe)	89·1	61·2	19·21	1·24	0·9156	9·37
Linseed oil (Riga, seed)	205·4	85·5	19·21	1·25	—	—
Linseed oil (St. Petersburg)	200·0	84·2	19·28	1·23	—	—
Linseed oil (North American). . . .	194·6	83·2	19·21	1·10	—	—
Linseed oil (Calcutta) .	188·6	81·7	19·28	0·88	—	—
Linseed oil (River Plate)	185·5	81·0	19·14	1·25	—	—
Ravison oil	118·1	71·0	18·13	1·65	—	—
Jamba oil	98·3	67·2	17·53	1·02	—	—
Rape oil (East India) .	104·5	68·0	17·53	1·02	—	—
Almond oil	98·1	64·3	—	—	—	—
Castor oil	85·6	78·3	18·16	0·60	—	—

Table II.

Oils obtained from Reliable Sources.

	Iodine Value (Wijs).	Zeiss Refractometer at 25°C	Saponification Value. Per cent	Unsaponifiable Matter. Per cent	Specific Gravity, 60 F.	Free Acid. Per cent.
Olive oil (Crete) . .	81·2	60·2	19·14	—	0·9155	9·40
Olive oil (Italian) . .	83·5	59·7	19·21	—	0·9157	16·61
Olive oil (Sicilian) . .	84·1	60·0	19·07	—	0·9144	11·50
Olive oil (Levant) . .	84·4	61·0	19·21	—	0·9159	9·32
Olive oil (Algerian) . .	85·1	60·7	19·14	—	0·9150	5·62
Olive oil (Syrian) . .	85·3	60·1	19·14	—	0·9145	11·76
Olive oil (Spanish) . .	86·6	61·2	19·21	—	0·9161	7·27
Olive oil (Mogador) .	94·3	60·5	19·07	—	0·9150	24·72
Poppy-seed oil . . .	140·0	71·0	19·28	0·52	0·9243	1·62
Sunflower oil (Russian) (by Hübl's method) .	131·3	70·0	18·93	0·70	0·9220	1·21
Arachis oil	87·5	62·6	19·14	—	0·9164	—

In the case of the olive oils prepared from the olives by the authors, those extracted by carbon bisulphide were from the residue left after pressing out the bulk of the oil, and it will be observed that there is little difference between the two varieties. It is evident from these results that a genuine olive oil may vary in iodine value from 81 to 89, and may be regarded as such if the other constants are normal. There is a peculiarity with regard to the Mogador oil, which has an extremely high iodine value, while the refractometer reading is lower than would be expected. With linseed and fish-liver oils it is found that the iodine value and refractometer reading practically rise and fall simultaneously, but olive oil appears to be quite erratic in this respect, as will be seen by an inspection of the tables. This difference is no doubt partly due to the influence of the free fatty acids, which, it has been stated, lower the refractive power, and this is undoubtedly the case, as will be seen from Table III.

TABLE III.

Effect of Free Fatty Acids on the Refractive Power of Olive Oil.

	Olive Oil (Mogador).	Olive Oil (Italian).
Iodine value before removal of free acid	94·30	83·50
Iodine value after removal of free acid	93·45	80·45
Zeiss refractometer, 25°C. before removal of free acid	60·50	59·70
Zeiss refractometer, 25°C. after removal of free acid	63·40	61·00
Free oleic acid, per cent. before removal of free acid	24·72	16·61
Free oleic acid, per cent. after removal of free acid	0·32	0·27

TABLE IV.

Comparison of Iodine Value and Refractive Power of Linseed and Certain Fish-liver Oils.

	Iodine Value	Zeiss Refractometer at 25°C.
Linseed oil (Riga)	205·4	85·5
Linseed oil (St. Petersburg)	200·0	84·2
Linseed oil (North America)	194·6	83·2
Skate-liver oil	191·1	82·5
Linseed oil (Calcutta)	188·6	81·7
Haddock-liver oil	186·4	81·0
Linseed oil (River Plate)	185·5	81·0
Whiting-liver oil	184·2	81·0

The differences referred to cannot, however, be entirely explained by the influence of the free acid, as will be apparent from an examination of the results in Tables I. and II., and especially of those of the two oils extracted from the same Spanish ripe olives, where the oil with the lower iodine value shows the higher refractive power, the free acids being practically the same.

The different samples of linseed from which the oils were prepared were carefully examined, and any foreign seeds removed. It will be observed that the iodine value for the oil extracted from the Riga seed is the highest on record, while that from the River Plate has an iodine value much higher than what was recorded some years since. There can be no doubt, however, that these high figures are due partly to the use of the Wijs in

place of the Hübl method, and where the former is employed any iodine value below 180 should lead to a more searching examination of the oil.

As regards the other oils of which the constants are included in the tables, it is scarcely necessary to make any remarks, except that the jamba oil cannot be distinguished from rape oil by ordinary means, and that in some few cases the employment of the refractometer along with the iodine value may be useful, although the former is of no independent importance.

Olive Oil, Detection of Small Amounts of Arachis Oil in. C. Blarez. (*Bull. Pharm. Bordeaux*, 1906, 295; *Journ. Pharm. Chim.* [6], **25,** 451.) Two c.c. of the oil is placed in a small flask with a piece of pumice weighted with Pt. wire, 20 c.c. of a 5 per cent. solution of KOH in alcohol 90 per cent. is added, and the mixture is boiled for 10 minutes under a reflux condenser. After removing the heat, the soap solution is filtered into two perfectly dry test-tubes, corked, and one is set aside, as it is, in a cool place for 24 hours. If a small flocculent precipitate is formed the presence of arachis oil is shown. To the contents of the second tube 2·5 c.c. of absolute alcohol is added, and this is also stood in a cold place. The first tube will distinctly show the presence of 8 to 10 per cent. of arachis oil; if the temperature be below 15°C. as little as 5 to 6 per cent. will give a suspicious precipitate. The second tube gives a slight but distinct precipitate with 3 or 4 per cent. of arachis oil at 17 to 18°C., and with 5 per cent. the result is unmistakeable. If more than 10 per cent. of cotton-seed oil be present the test is not conclusive. (See also *Year-Book*, **1905,** 118.)

Olive Oil, Javan. K. Wedemeyer. (*Apoth. Zeit.*, **21,** 750.) The so-called "Javan olive" is the seed of a Sterculiaceous tree with white fleshy cotyledons which contain 46·6 per cent. of oil. This is yellow in colour and has a pleasant, very slightly rancid taste; it is insoluble in alcohol and fluid at ordinary temperatures. Sp. gr. 0·9260 at 15°C., η_D 1·4654; iodine value, 76·6; saponification value, 18·79; Hehner value, 95·6; Reichert-Meissl value, 0·8; acetyl value, 23·5; non-saponifiable matter, 0·17 per cent. When heated to 240–245°C. it suddenly changes to a mass resembling cherry-tree gum and insoluble in most solvents.

Olive Oil, Presence of Copper in. N. Passerini. (*Stez.*

Sper. Agric. Ital.; Journ. Pharm. Chim.) The author has found 0·0005 per cent. of Cu in olive oil derived from trees which had not been treated with any copper insecticide. This amount of the metal is considered to be a normal constituent of the oil.

Olive Oil, Tunisian, Abnormal Iodine Value of. R. Marcelle. (*Annales de Chim. Analyt.*, **12,** 188.) The iodine value of the greater part of the olive oil produced in Tunis is markedly higher than that of oils grown in other countries. Three specimens of oil prepared under the supervision of the author gave by Wijs' method an iodine value of 92.0 to 95·5; the absorption for the fatty acid ranged from 106·5 to 109. The lowest observed oil had the iodine value 79·9 and that of its fatty acids was 97. The varieties of oil with the high iodine value form the bulk of the Tunisian oil. The oil produced from one factory in the neighbourhood of Tunis with an output of 250,000 kilos had the iodine value fluctuating between 90 and 92. An Algerian oil, produced on the Tunisian frontier, gave a value as high as 95·7. Tunisian oil is specially suited for many purposes, since the proportion of concrete glycerides is very low, so that its congealing point is low, 3 or 4°C. The abnormal iodine value has, however, led to the erroneous conclusion that these oils are adulterated, which is not the case.

Ophiotoxin, the Active Principle of Cobra Poison. E. S. Faust. (*Archiv. exper. Path.; Apoth. Zeit.*, **22,** 119.) The active principle of Indian cobra venom is ophiotoxin, $C_{17}H_{26}O_{10}$, an animal sapotoxin. It is a yellowish amorphous powder, slowly soluble in water. The aqueous solution is feebly acid in reaction and intensely toxic to animals when injected. It is precipitated by saturated solution of $AmSO_4$, but not by NaCl or Na_2SO_4. It does not reduce Fehling's solution after boiling with HCl; it precipitates metals from alkaline but not from acid solutions. It contains the same number of carbon atoms as bufotalin but twice as many oxygen atoms. The addition of alkali to the toxic faintly acid aqueous solution renders it very nearly inert.

Opium, Morphinometric Assay of, and of Tincture of Opium. E. H. Farr and R. Wright. (*Pharm. Journ.* [4], **24** **164.**) The subject is thoroughly dealt with from the standpoint of the official process, the general principles of which are stated

to be sound, and to yield results as accurate and comparative as can be expected from a simple method when dealing with so complex a mixture of bases and other organic as are present in opium. Criticisms passed on the official process by other workers are considered and all statements are verified by actual experiment. The paper is itself a summary of much work and detailed practical observations and, as such, cannot be usefully summarized. The following are the recommendations for the various assay processes :—

(*a*) *Assay of Opium.*—Following the B.P. monograph as to quantities, 102 c.c. or not more than 102·5 c.c. of lime filtrate should be collected. It is preferable, however, to take 8 Gm. opium, 2 Gm. CaH_2O_2, and 80 c.c. of water; filter off 51 c.c. as representing 5 Gm. of opium.

(*b*) *Assay of Strong Tincture of Opium.*—Instead of working in 80 c.c., take 40 c.c., evaporate to 10 c.c. or until all alcohol has been driven off, add 1 Gm. calcium hydroxide, triturate well, dilute to 42 c.c., filter off 25 c.c. (representing 25 c.c. strong tincture). Take 0·2 Gm. crude morphine for titration.

(*c*) *Standardized Tincture of Opium.*—As for strong tincture, but dilute to 41·5 c.c. Filter off 25 c.c. Take 0·15 Gm. crude morphine for titration.

(*d*) *Liquid Extract of Opium.*—Process as for (*c*), but dilute to 41 c.c.

(*e*) *Solid Extract of Opium.*—Take 2·5 c.c., dissolve in 20 c.c. hot water, let cool, mix thoroughly with 1 Gm. $Ca(HO)_2$, dilute to 51 c.c. Filter off 40 c.c.=2 Gm. extract, and proceed. Take 0·3 Gm. crude morphine for titration.

Orange, Essential Oil of, Formation and Distribution of, in the Sweet Orange Tree. E. Charabot and G. Laloue. (*Bull. Soc. Chim.* [3], **35,** 913.) The study of the behaviour of the sweet orange during the year, completes the series of observations already published on the formation and distribution of essential oils in the plant. The results confirm those previously recorded that essential oil is formed more actively in young organs than in those which have attained full development. The stem is notably poorer in essential oil than the leaf, and in the case of the sweet orange the stem oil is poorer in citral. The proportion of essential oil in the stem tends to decrease. (See also *Year-Books,* **1900,** 169; **1901,** 66; **1904,** 339; **1905,** 49, 200.)

Orange, Sweet and Bitter, Characters of, Essential Oil of. (*Schimmels' Report, October*, **1906, 35.**) In conformity with results obtained in the analytical control of specimens of bitter and sweet orange oils, extending over recent years, the following amended characters are now given as indicating oils of good quality.

Bitter Orange Oil.—Sp. gr. 0·854 to 0·857 at 15°C; $\alpha_{D20°}$ 90° to + 93°; α_D of first 10 per cent. of distillate higher than that of original oil. Residue on evaporation 3 to 5 per cent.

Sweet Orange Oil.—Sp. gr. 0 848 to 0·853 at 15°C.; $\alpha_{D20°}$+95° to +98°; α_D of first 10 per cent. not at all or only slightly lower than that of original oil. Residue on evaporation 2 to 4 per cent. (See also *Year-Books*, **1887,** 231; **1895,** 168; **1901,** 78, 94; **1902,** 161).

Origanum smyrnaeum, Essential Oil of. (*Schimmels' Report, October*, **906,** 48.) A specimen of Cretan origanum oil has been found to contain about 5 per cent. of cedrol $C_{15}H_{26}O$, the sesquiterpene alcohol known as cedar camphor. It is not certain if this is a natural constituent of the oil, or if its presence is due to adulteration with oil of cedar. The original oil had the following characters :—Sp. gr. 0·9386 at 15 C.; phenols, 41 per cent.; solubility in alcohol 70 per cent. 1 : 2 to 2·5. The cedrol was isolated from the highest boiling fractions resulting from steam distillation.

Origanum, Syrian, Essential Oil of. (*Schimmels' Report, April*, **1907,** 75.) This oil resembles Cretan origanum oil; sp. gr. 0·936 to 0·960 at 15°C.; α_D up to +1°35′; phenols, 65 to 72 per cent.; solubility in alcohol 70 per cent. 1 : 2 to 1 : 3, with turbidity on adding more. The phenol is carvacrol.

Orris Oil, Some New Constituents of. (*Schimmels' Report, April*, **1907,** 76.) The portion of liquid orris oil more volatile than irone, which is removed on account of its unpleasant odour in the manufacture of fluid orris oil, is a yellow liquid with an unpleasant basic odour somewhat like skatol. From it furfural, normal decyclic aldehyde, nonylaldehyde, naphthalin, and a ketone with a mint-like odour have been isolated. The occurrence of naphthalin is of interest since it is of rare occurrence in essential oils, having been recorded only in clove stem oil and in storax (See *Year-Book*, **1903,** 121). Besides these constituents traces of a base, a phenol and an alcohol were detected. Oleic

anhydride found by Tiemann and Krueger in extracted orris oil was not present in the distilled oil. (See also *Year Book*, **1900**, 171.)

Oxyquinones, Distinctive Reactions of. A. Brissemoret and R. Combes. (*Journ. Pharm. Chim.* [6], **25**, 53.) 0 05 Gm. of the substance is dissolved in a porcelain capsule in 10 c.c. of alcohol 90 per cent.; 5 c.c. of 5 per cent. solution of nickel sulphate is added. Perezone and embelic acid give a blue colour and form a precipitate; juglone and the quinone of *Drosera intermedia* give a violet colour with no precipitate; chrysophanol and emodin give a rose-red colour but no precipitate. The product of the nickel reaction is then evaporated to dryness on the water-bath, and the residue is taken up with HCl 1 : 500; the mixture, without filtration, is shaken out with $CHCl_3$. The $CHCl_3$ solution is evaporated on a square of white filter paper and dried. When this paper is exposed to ammonia vapour the following characteristic colours are developed. With perezone and embelic acid, blue; with juglone and Drosera quinone, violet; with chrysophanol and emodin, red. It is thus seen that the benzene, naphthalene and anthracene series are distinguishable by their colour reactions.

Oxyquinones in Plants.—Ten Gm. of the material is macerated for 24 hours in 50 c.c. of pure ether; after filtration the ether is evaporated and the residue taken up with 10 c.c. of alcohol 90 per cent. This is then tested as described above. With the nickel test the blue reaction of the benzene-oxyquinone series is given by the dried fruits of *Embelia ribes*. The violet colour of the naphthalin series is afforded by the fresh leaves of *Juglans regia*, the dried bark of *J. cinerea*, and by the fresh plants of *Drosera rotundifolia* and *D. intermedia*. The rose-red colour of the anthracene group is given by Barbados aloes, cascara bark and Chinese rhubarb. The same materials give the corresponding reactions with the paper test above detailed. Cochineal carmine which has been regarded as a naphthoquinone, fails to give the characteristic reaction of that group of bodies. *Ceratostigma plumbaginoides* and *Drysosphyllum* (?) have given two new oxynaphthoquinones, and the quinone of *Plumbago europea* considered to be an anthraquinone by Dragendorff and a naphthoquinone by Bettinck is found to be an oxynaphthoquinine.

Palmarosa, Essential Oil of, Adulterated. (*Schimmels' Report*,

April, **1907,** 55.) A specimen of palmarosa oil has been met with, which, although it agreed in general characters with the genuine oil, except that its refraction index was abnormal, was found to contain alcohol equivalent to 20 per cent. of ethyl alcohol 90 per cent. It was possibly a mixture of citronella and palmarosa oils, or their fractions, the characters of which had been "adjusted" by addition of alcohol.

Paper, Acidity of, Influence of, in causing Fading of Ink. — Vandevelde. (*Chem. Centralb.*; *Nat. Drugg.* **37,** 138.) The presence of a trace of free acid in paper has been found to cause the fading of ink. The subject is one of considerable importance, specially with regard to paper intended for documents. To determine the amount of free acid, ten Gm. of paper, cut into small pieces is macerated with agitation with 100 c.c. of distilled water for 24 hours. The liquid is then decanted, the pulp washed with another 25 c.c. of water and rubbed down with N/10 Ba 2(OH) solution, the first liquid being added. The number of c.c. of N/10 Ba 2(OH) solution used up by 100 Gm. of the dry paper, with phenolphthalein indicator is called the "acid coefficient." This should not exceed 50 in paper intended for use as documents. Specimens of paper examined ranged in acidity from 0 to 280. The best ink for documents is an iron nutgall preparation containing 5 5 Gm. of Fe and 7 Gm. of lamp-black in the litre.

Paraphenylene Diamine, Detection of, in Hair Dyes. — Kochs. (*Apoth. Zeit.*; *Journ. Pharm. Chim.* [6], **24, 373.**) Paraphenylene diamine has been shown (*Year-Books*, **1905, 124**; **1906,** 58) to be an injurious ingredient in hair dyes. Its presence may be detected by the following reactions. When the solution boiled with HCl is treated with excess of chlorinated soda a white flocculent precipitate is formed which crystallizes from alcohol in needles, m.p. 124°C. The solution with HCl when gently warmed with SH_2 and Fe_2Cl_6 gives an intense violet colour. A faintly acid solution treated with aniline and Fe_2Cl_6 gives a deep blue colour. Solutions containing paraphenylene diamine colour pieces of deal bright red; the tint is rendered deeper by treatment with acetic acid.

Pareira Root, New Dextrorotatory Alkaloid from. M. Scholtz. (*Archiv. Pharm.*, **244,** 555.) After extracting ordin-

ary bebeerine, $C_{18}H_{21}NO_3$, which is laevo-rotatory, $[\alpha]_{D28}-298_D$, by means of ether, from the total alkaloids of pareira root, another, dextro-rotatory base of the same formula dextro-bebeerine $[\alpha]_D+297°$ has been separated from the amorphous matter insoluble in ether, by extracting it with pyridine and precipitating the pyridine solution with methyl alcohol. It behaves in all respects like bebeerine except in its dextro-rotation.

Pastinaca sativa, Essential Oil of. (*Schimmels' Report, October*, **1906,** 51.) The dry fruits, umbels and roots of *Pastinaca sativa*, cultivated at Miltitz, have been distilled.

Oil from fruits. Bright yellow in colour ; yield 1·47 per cent. ; sp. gr., 0·8736 at 15°C ; $\alpha_D-0°9'$; $\eta_{D10°}$ 1·43007 ; acid value, 4·4 ; ester value, 240·6 ; acetyl value, 276 ; solubility in 80 per cent. alcohol, 2 : 5.

Oil from umbels. Colour dark brown with odour somewhat like ambrette oil ; yield 0·3 per cent. ; sp. gr. 1·0168 at 15°C ; $\alpha_D-0°50'$; η_{D20} 1,50049 ; acid value, 4·2 ; ester value, 62·9 ; acetyl value, 86·2 ; solubility in alcohol 80 per cent., 2 : 13.

Oil from roots. Colour bright yellow ; odour somewhat similar to that of vetiver oil ; yield 0·35 per cent. ; sp. gr. 1·0765 at 15°C ; $\alpha_D-0°10'$; η_{D20} 1·52502 ; acid value, 3·9 ; ester value, 12·6 ; acetyl value, 33·7 ; not completely soluble in alcohol 80 per cent., soluble 6 : 10 and more in 90 per cent. alcohol.

Pennyroyal, American, Essential Oil of. M. Barrowcliff. (*Proc. Chem. Soc.*, **23,** 114.) The oil examined had the following characters :—Sp. gr. 0·9297 at 15°C. ; $\alpha_{D22°}$ + **25°44'** ; **solubility** in alcohol 70 per cent. 1 : 2. It contained a small amount of an undetermined phenol ; laevopinene ; laevo-lemonene ; depentene ; about 8 per cent. of 1-methyl-3-cyclohexanone ; about 30 per cent. of pulegone ; laevo-menthone ; dextro-iso-menthone, these two menthones comprising about 50 per cent. of the oil ; about 2 per cent. of sesquiterpene alcohols ; esters of formic, acetic, octoic, decyclic and salicylic acids ; an ester of a dibasic acid with the formula $C_8H_{14}O_4$ and free formic, butyric, octoic and decyclic acids.

Pentaclethra macrophylla, Fixed Oil of. (*Bull. Imp. Inst.*, **5,** 10 ; and K. Wedemeyer. *Apoth. Zeit.*, **21,** 796.) The consignment of these oil seeds from Southern Nigeria arrived

at the Imperial Institute in bad condition, the kernels of a large portion being discoloured. The oil was, therefore, extracted and examined separately from the dark and white kernels. In the following figures the first refers to the product of the white kernels, the second to that of an average sample of dark and white kernels. Sp. gr. at 100°C. 0·8637, 0·8627; solidifying point, 8°C., 5°C; saponification value, 185, 182; acid value, 4·6, 10; iodine value, 94·3, 94·4; Hehner value, 94·2, 95·7; m.p. of fatty acids, 52·4°C, 53·4°C. Although this m.p. is high, the oil yields a soap of soft consistence. The oil of the white kernels is slightly pungent and pale yellow in colour, that from the average sample darker and more pungent. The yield is 31·2 per cent. on the whole beans, or 39 per cent. on the kernels. After expressing the oil, the press cake contains 34·8 per cent. of proteids, 8·2 per cent. of dextrose and 33·7 per cent. of other carbohydrates. Notwithstanding the high nutritive value of this, it is not considered that the beans will prove a remunerative article of commerce.

Wedemeyer gives the following characters for this oil, which is known in commerce as "Owala oil" from Western Africa. The seeds contain about 41·6 of oil, extracted by ether. Owala oil is pale yellow, liquid at ordinary temperatures excepting a slight deposit; the taste is at first pleasant, then harsh; the odour is pleasant. When refined it is a delicate oil applicable for culinary purposes. The crude oil has the sp. gr. 0·9119 at 25°C; it is butter-like at 4°C., becoming pourable at 8°C.; iodine value, 99·3; saponification value, 186; Hehner value, 95·6; Reichert-Meissl value, 0·6; acetyl value, 37·1; acid value, 9; nonsaponifiable matter, 0·54 per cent.; m.p. of fatty acids, 52·1.

Pepper, Adulterated, Italian. F. Truffi. (*Journ. Pharm. Chim.* [6], **25,** 200, after *Boll. Chim. farm.*) Pepper adulterated with a thick dressing of wheat flour, umber, and plaster of Paris is frequently met with in Italian commerce. The coated grains are of a chestnut colour, smoother and rounder than the pure spice: 100 grains weigh 6·62 Gm., whereas the weight of 100 normal grains is from 4·5 to 4·96 Gm. The former, when treated with water, are deprived of their dressing, giving a cloudy, dirty, yellow liquid and the pepper grains left are of inferior quality.

Peppermint, Russian, Essential Oil of. J. Schendelmeiser. (*Apoth. Zeit.*, **21,** 927.) The oil was distilled from

plants cultivated in Tambow. Sp. gr. 0·908 at 15°C.; a_D—19° 48′; menthyl acetate, 4·8 per cent.; free menthol, 51·22 per cent.; menthone, 16·36 per cent. Solubility in 70 per cent. alcohol, 1 : 4. The first runnings of Russian peppermint oil are not bulked with the rest but are collected apart and used for perfuming soap. It contained a small quantity of a body, b.p. 115–120°C., probably an aldehyde; inactive pinene and a probable mixture of laevo- and dextro-limonene cineol were present, but menthene could not be detected. From a fraction, b.p. 208–210°C., a laevorotatory menthone, a_D—17°18′, was isolated, which is probably a mixture of lævo- and dextro-menthone. (See also *Year-Books*, **1891**, 219; **1901**, 97, 98.)

Pepsin, Assay of, by Means of the Biuret Reaction. W. B. Cowie and W. Dickson. (*Pharm. Journ.* [4], **24**, 198.) Further work on this method which is conducted as described below is published, and the authors claim that it is a measure of the actual peptonizing power, as distinct from the solvent action, of a pepsin. It yields results sufficiently near those obtained by standard methods to give a very good idea of the power of a pepsin, and can be carried out in a comparatively short time (6 samples can be put on and completed in 8 hours). No special apparatus is required.

An amount of scale albumin equal to 1 Gm. of actual or dried albumin is placed in a glass mortar, triturated, and washed into a 100 c.c. flask with 20 c.c. of water at 40°C. The albumin is coagulated by heating on the water-bath for 15 minutes. It is now cooled to 40°C. and 0 25 Gm. pepsin added, which is washed into the flask with 50 c.c. of N/10 hydrochloric acid. The whole is vigorously shaken, placed in water, kept in a digesting pan at 40°C. for 4 hours, the flask being shaken every half-hour. At the end of that time the flask is immersed in boiling water for a quarter of an hour to prevent further action of the enzyme; the contents are then cooled to 15°C. and made up to 100 c.c. with water; 10 c.c. of the mixed liquid are placed in a test tube, 13 Gm. of $ZnSO_4$ and 0·2 c.c. H_2SO_4 (1 : 4) being added. The whole is then heated to boiling, cooled quickly with centrifugal action, and filtered through a dry filter into a dry test tube. Five c.c. of the filtrate are placed in a 100 c.c. Nesslering tube, mixed with 15 c.c. of water, 1 c.c. of 0 5 per cent. solution of $CuSO_4$, and made up to 80 c.c. with 30 per cent. NaOH solution. (Any slight precipitate may be filtered off

through glass wool, or the precipitate may be allowed to settle and an aliquot part of the clear liquid pipetted off and Nesslerized.) Seventy-five c.c. of distilled water are placed in a similar tube, and standard permanganate solution (0 04 Gm. per litre) is run in from a burette until the depth of colour is the same in each, the tubes being viewed longitudinally over a mirror, as in Nesslerizing. A blank experiment is carried out in exactly the same manner, except that the albumin is not added. The results are calculated as follows :—

The number of c.c. of standard solution required, minus blank in c.c., multiplied by 0 25 multiplied by 100 = percentage of peptone from albumin used.

Pepsin, Simple Method of Testing. F. R. Eldred and W. C. Bartholomew. (*Proc. Amer. Pharm. Assoc.*, **1906,** 396.) The method consists in determining by the Kjeldahl method the amount of total nitrogen in the filtrate, after digesting solution of dry egg albumin with the pepsin at 40°C. for 2 hours, coagulating the undigested albumin, and filtering.

Persea gratissima, Essential Oil of. (*Schimmels' Report, October,* **1906,** 59.) The oil was distilled from the leaves of a specimen growing at Grasse. It is known in the South of France as "essence d'avocatier." It was greenish in colour with an odour recalling anise and tarragon ; sp. gr. 0 956 at 15°C. ; a_D, 2°22′ ; η_{D20° 1·51389 ; ester value, 3 8 ; acetyl value, 18·9 ; soluble 1 : 6 in 80 per cent. alcohol with slight separation of paraffin. It became cloudy in a freezing mixture, but did not congeal. The main constituent is methyl chavicol, with some dipentene and paraffins.

Phenols, Determination of, in Essential Oils. (*Schimmels' Report, April,* **1907,** 118.) For determining eugenol in clove oil, 10 c.c. of the oil is treated in a Hirschsohn flask with 3 per cent. NaOH solution, agitating and heating for 10 minutes on the water-bath, then filling up the flask with more 3 per cent. NaOH solution and reading of the non-eugenol layer in the usual manner. With oils containing thymol and carvacrol better results are obtained with 5 per cent. NaOH solution. The solvent action on the non-phenols of NaOH solution stronger that 3 per cent. in the case of clove oil is due to the dissolved eugenol sodium compound, and not to the alkali. After removing the eugenol with 3 per cent. NaOH solution, nothing

is dissolved from the remaining non-eugenol portion by subsequent treatment with 5 per cent. NaOH solution.

Phosphoric Acid, Syrupy, Commercial Samples of. T. G. Joyce. (*Pharm. Journ.* [4], **23,** 145.) Four specimens of commercial syrupy phosphoric acid were examined with the following results :—

	1	2	3	4
Specific gravity at 15·5°C.	1 750	1·765	1·746	1·741
Arsenium—per cent.	0 00013	0 00000	0 00000	0·00011
Sulphuric acid—per cent.	0 0000	0 0081	0 0154	0·0236
Hydrochloric acid—per cent.	0 0000	0 0000	0 0000	0·0046
Phosphorous acid	Heavy traces	Traces	Traces	None
Nitric acid, Metaphosphoric acid, Pyrophosphoric acid, Silica, Heavy metals	None found	None found	None found	None found

In two of the samples (Nos. 2 and 3) the absence of arsenium has been ensured at the expense of the introduction of sulphuric acid, while in sample No. 4 both arsenium and sulphuric acid are present.

Phosphorus, Determination of, and Distribution in Alimentary Substances. — Balland. (*Journ. Pharm. Chim.* [6], **25,** 9.) The usual method of determining P_2O_5 in the ash of food stuffs has been shown to give results below the truth, since a portion of the phosphorus, in organic combination, is lost in the process of incineration. More correct figures are obtained by the following method of procedure :—Five Gm. of the material is heated in a Kjeldahl flask with 20 c.c. of pure H_2SO_4 and 20 c.c. of HNO_3 ; the organic matter is destroyed exactly as in a nitrogen determination. When nitrous vapours cease to be evolved, 1 Gm. of mercury is added and heating continued until the liquid is clear. After cooling, the acid liquid is diluted with about 80 c.c. of water, and filtered to remove silica ; the filtrate and washings are then treated with 15 c.c. of ammonium citrate solution (obtained by dissolving citric acid 200 Gm. in sufficient solution of ammonia to produce 1,000 c.c.) excess of AmOH, about 75 c.c., and 4 or 5 c.c. of magnesium mixture prepared with $MgCl_2$, 150 Gm. ; AmCl, 200 Gm. ; AmOH solution, 1 : 2, to make 1,000 c.c. The mixture is allowed to stand over-night ;

the precipitate is collected, washed with AmOH solution 1 : 2, incinerated and weighed as $Mg_2P_2O_7$ in the usual manner.

Determined in this manner the phosphorus in cereals gave the following values expressed as P_2O_5. In *wheat* it oscillated between 0·65 and 1·11 per cent., excepting the Australian grain, in which it is lower. *Oats* contained about the same proportion. In *maize, millet, barley, rye, buckwheat,* the maximum approached 0·8 per cent. In *whole rice* this figure is approximated, but in *hulled rice* it fell to 0·25 per cent.

In *flours* the whitest, such as are used for making the highest class of bread, contained the least P_2O_5, 0·20 per cent.; the germs and bran were found to contain relatively much more.

Fruits such as *cherries, strawberries, currants, oranges, pears, apples* and *grapes* generally contain less than 0·1 per cent. of P_2O_5. *Dried figs, dates,* and *bananas* contain 0·3 per cent.; *almonds* and *nuts,* 0 9 per cent.

Beef, mutton, veal and *poultry* gave 0·45 per cent., which is also the mean of the preserved meats of the military stores.

Fish contains more, 0·6 per cent.; *gudgeon* fried whole, with heads and bones, gave 1·9 per cent., and without the heads, 1·54 per cent. *Snails, oysters,* and *mussels* give between 0·26 and 0·35 per cent. *Cheese* is the richest of all foods in P_2O_5. Gruyère contained most with 1·81 per cent.; Dutch, 1·62 per cent.; other French cheeses, 1·28 to 0·78 per cent.

Roasted coffee contained 0·40 per cent., and coffee ground after infusion, 0·28 per cent. *Cocoa* contained 1·3 per cent.; *chocolate with milk,* as usually prepared as a beverage, 0·62 per cent.

Phosphorus is unequally distributed in the animal organs. The brain contains more than the kidneys, and these more than the liver.

Eggs contain 0·26 per cent., the white only 0·015 per cent. About half the phosphorized constituents of the yolk are soluble in ether.

Phosphorus, Determination of, in Phosphorated Resin and other Galenical Preparations. C. E. Vanderkleed and J. L. Turner. About 0·5 Gm. of the material with 15 c.c. is oxidized in a Kjeldahl flask with 20 c.c. of HNO_3, sp. gr. 1·48. After action is complete organic matter is removed by the Kjeldahl method, and the phosphoric acid is then determined in the acid mixture in the usual manner. (See also Balland's method above.)

Picea excelsa Cones, Essential Oil of. (*Schimmels' Report, April,* **1907,** 85.) The old cones of *Picea excelsa* from Thuringia, gave when distilled and the crude oil was rectified, a greenish-yellow product with a stale, musty odour. Sp. gr., 0·8743 at 15°C. ; a_D —19°15′ ; acid value, 1·8 ; ester value, 3·9 ; solubility in 90 per cent. alcohol, 1 : 7.

Pilea, Essential Oil of. (*Schimmels' Report, October,* **1906,** 83.) A *Pilea* of undetermined botanical species has yielded a white essential oil with an odour of turpentine ; sp. gr. 0 8533 at 15°C. ; a_D, + 33°35′ ; η_{D20°, 1·46862 ; ester value, 5·1 ; acetyl value, 24·2 ; solubility in alcohol 90 per cent. 1 : 5 and more with slight turbidity. A small amount of pinene was detected in the oil, but its other constituents have not yet been identified. This oil is of interest as being the first instance of an essential oil derived from the N.O. *Urticaceae.*

Pilocarpine Nitrate, Commercial. (*Southall's Report,* **1907,** 27.) Not one specimen of this salt has been met with melting at 176°–178°C., stated by authorities to be the m.p. of the pure salt. Out of 12 samples the best melted at 170°C., another possessing a melting-point as low as 158°C.

Pinus abies Resin, Constituents of. P. Klason and J. Koehler. (*Journ. prakt. Chem.,* **73,** 337 ; *Journ. Pharm. Chim.* [6], **24,** 29.) The acids hitherto isolated from the various *Pinus* resins, such as abietic, pinic, sylvic and pimaric acids are stated not to be definite bodies but mixtures or decomposition products. They have all been isolated by processes involving the application of heat, and from colophony, which in itself is a decomposition product of heat. All these acids have the common formula $C_{20}H_{30}O_2$, and readily oxidize into bodies insoluble in petroleum ether and in oil of turpentine.

The authors have isolated two acids, a- and β-colophonic acid, of which the former is certainly a definite compound. The portion of the resin of *Pinus abies* which is soluble in petroleum ether is distilled *in vacuo.* The fraction boiling between 250–300°C. under 20 Mm. was crystallized from petroleum ether. By fractional crystallization this was separated into a-colophonic acid, $C_{20}H_{30}O_2$, forming clino-rhombic prisms m.p. 198–199°C. ; a_D—50° ; and β-colophonic acid, $C_{20}H_{30}O_2$, in small prisms, m.p. 168–173°C. ; a_D+52°. It is more soluble than the a-acid.

Pinus halapensis, Algerian, Essential Oil of the Needles of, Phenyl-ethyl Alcohol in. E. Grimal. (*Comptes rend.*, **144,** 434.) The fraction of the essential oil of *Pinus halapensis*, boiling between 120°–135°C. under 10 Mm., gives, when saponified, and again fractionated at 95–98°C. under 8 Mm., a product which forms an ester with phthalic anhydride. When this is purified by treatment with ether, and saponified, it yields phenylethyl alcohol, $C_{10}H_{18}O$, sp. gr. 1·0187 at 15°C., optically inactive, η_{D18}, 1·52673. It yielded phenylacetic acid, m.p. 76–77°C. when oxidized with CrO_3, and benzoic acid with $KMnO_4$. With phenyl isocyanide it gives the characteristic phenylurethane $C_{15}H_{15}O_2N$ in fine silky crystals, m.p. 79–80°C.

Pinus pumilio, Characters of Essential Oil of. (*Schimmels' Report, October*, **1906,** 62.) The characters previously given for pure mountain pine oil, sp. gr. 0·865 to 0·875 at 15°C.; a_D, −4°30′ to −9°; ester content = 5 to 7 per cent. of bornyl acetate, are now considered to be too stringent, as are also the requirements of the B.P., which are practically the same. During the present season oils were distilled, which, although perfectly pure, failed to respond to these requirements. Thus, distillates from the Tyrol of undoubted purity, fluctuated between the following limits:—sp. gr. 0·8596 to 0·8629; a_D, −10°57′ to −15°20′; ester content, 4 to 4·9 per cent.; solbility in 90 per cent. alcohol, 1 : 4·5 to 6. Genuine Styrian oil also gave results differing from previously accepted standards, thus: −Sp. gr. 0·8705; a_D, −3°47′; esters 4 per cent.; solubility in 90 per cent. alcohol, 1 : 8. Consequently no definite "constants" can at present be fixed for this oil.

Pinus resinosa and Pseudtsuga taxifolia as a Source of Pitch and Turpentine. G. B. Frankforter. (*Journ. Amer. Chem. Soc.*, **28,** 1467.) The Norway pine, *Pinus resinosa*, and the Douglas fir, *Pseudtsuga taxifolia*, are suggested as possible rich sources of pitch and turpentine to supplement the failing source of these products from the Southern States. The two conifers named are the chief lumber-producing trees of North and North-West America; at present their turpentine is entirely wasted; logs rich in resin being either discarded or burned. "Boxing" as a method of production is not practicable in the North; the turpentine would have to be obtained by distillation or extraction. In view of the increased demand for turpentine

and pitch products and the diminishing output of the present sources, the utilization of these waste products in the North should prove remunerative.

Norway pine logs contain from 6·2 to 42·6 per cent. of oleoresin; when first collected by boxing this is colourless and mobile; when extracted by solvents it is darker in colour; sp. gr. 0·8317 at 20°; a_D, + 4°. It contains about 20 per cent. of oil, and hardens on exposure to the air. The terpene obtained from this, and from the wood by steam distillation, has the b.p. 153 to 154°C.; sp. gr. 0 8636 at 20°C.; $[a]_D$, + 17 39′. The oil produced by the destructive distillation of the logs is more complex and gives terpenes with the sp. gr. 0 8666 at 20°C.; b.p. 158–160°C.; $[a]_D$, −7·56°.

Douglas fir also yields as much as 42·6 per cent. of oleoresin from rich logs. It was very aromatic when fresh; sp. gr. 0·9821; $[a]_D$, −8·82°. It yielded 22 per cent. of oil. The terpene of the steam distilled oil had the sp. gr. 0·8621; $[a]_D$, −47·2°; b.p. 153·7 to 154°C.; that from the oil of the destructive distillation of the wood had the sp. gr. 0 8662; $[a]_D$, −29 4°; b.p. 157 to 160°C.

Pinus sabiniana, Oleoresin and Essential Oil of. (*Schimmels' Report, October*, **1906,** 64.) The oleoresin of the Californian *Pinus sabiniana* was first examined by Wenzell (*Year-Book*, **1872,** 205), who isolated from it "abietene: Thorpe (*Liebig's Annalen*, **198,** 364) showed that this was normal heptane. A specimen of the oleoresin recently received from California was a semi-fluid yellow mass with a greenish reflection and a pleasant odour recalling that of sweet orange oil. It was soluble in alcohol, ether and benzene, but was only partially dissolved by petroleum ether. Acid value by cold saponification, 156; by hot saponification, 179 05. It gave 8·44 of white essential oil by steam distillation. The oil has the following properties:—Sp. gr. at 15°C., 0·6962; a_D −0°9′; on fractionating, 5 per cent. distilled at 974–98·5°C.; 87 per cent. at 98·5–99° and 8 per cent. above 99°C. The chief fraction was heptane.

Pittosporum undulatum, Essential Oil of. F. B. Power and F. Tutin. (*Journ. Chem. Soc.*, **89,** 1083.) The fruits of this Australian plant yielded 0·44 per cent. of essential oil; sp. gr. 0·8165 at 15°C.; a_D +74°4′; insoluble 1 : 10 in alcohol 70 per cent. It contained dextropinene, limonene, a body

which is probably an alcohol, yielding a ketone $C_9H_{14}O$, with an odour like coumarin; and an optically inactive sesquiterpene $C_{15}H_{24}$, sp. gr. 0·910; η_{D20°, 1·5030, which is not identical with any known sesquiterpene. Traces of palmitic and salicylic acids were found, also of a phenolic body with an odour like eugenol, small amounts of the esters of valerianic, formic, and other organic acids.

Podophyllin, The Ammonia Test for. D. B. Dott. (*Pharm. Journ.* [4], **23,** 431.) Although Henry has stated that the resin of *Podophyllum emodi*, under certain conditions, is entirely soluble in solution of ammonia, practical experience shows that relatively, under similar conditions, it is much less soluble than the resin of *P. peltatum.* A useful test to detect an admixture of "emodi" podophyllin in the official resin is performed as follows:—0·5 Gm. of the resin is mixed with 30 c.c. of equal volumes of solution of ammonia and water; after being well stirred up for 5 minutes, the mixture is filtered through counterpoised filters, the insoluble matter is washed with water until colourless, then dried and weighed. The weight should not exceed 15 per cent. of the resin. "Podophyllin" prepared from a mixture of 2 parts of *P. peltatum* rhizome mixed with 1 part of *P. emodi* gave 35·6 per cent. of insoluble residue by this test; whereas the resin of unmixed *P. peltatum*, B.P. podophyllin, yielded 7 6 per cent.

Podophyllin, Ammonia Test for. (*Southall's Report*, **1907, 32.**) Podophyllin from *P. peltatum.* Five specimens gave 7·04, 7·40, 11·80, 11·20 and 7·88 per cent. respectively of matter insoluble in ammonia.

Podophyllin from *P. emodi.* One specimen gave 58 per cent. of insoluble matter with ammonia.

Polyphenols, Colour Reactions of. E. P. Alvarez. (*Annales de Chim. Analyt.*, **12,** 9.) Five to 10 Gm. of the substance is placed in a small porcelain capsule with 20 to 30 Gm. of sodium dioxide and 5 c.c. of water; after the lapse of 5 or 6 minutes 15 c.c. of water is added. The following substances, in addition to those previously enumerated (*Year-Book,* **1905,** 133) give distinctive colours.

Emodin. Intense rose red, becoming yellow on adding a few drops of acetic acid. *Chrysarobin.* Wine-red, persisting

after the addition of water; changed to yellow by acetic acid. *Dioxyanthraquinone*, 1·2; fine bluish violet colour, persisting after adding water. On floating the capsule in water and blowing on the surface of the mixture, the edges of the liquid become red. It assumes an intense yellow colour with acids. *Alizarin* from madder; a still deeper violet, changing to orange with acids. *Tri-oxyanthraquinone*, 1·2.4; deep reddish violet changing to cherry red on adding water. *Chrysophanic acid*; cherry red, becoming brighter on addition of water. *Rosolic acid*: intense purple, persisting on adding water. *Alizarin-purpurin*: deep rose colour, permanent on adding water. *Anthragallol*: dull blue, almost black; persistent. *Dioxy-quinone*: chestnut yellow, red with water. *Ellagic acid*: chestnut black, yellow with water.

Poppy Capsules, Ripe and Green, Alkaloidal Strength of. Allan Malin. (*Apoth. Zeit.*, **22**, 215.) The following comparative figures have been obtained with ripe and unripe poppy capsules cultivated in Dahlem. *Green capsules* contain from 0·02 to 0·05 per cent. of morphine, and from 0·0113 to 0·0116 per cent. of codeine and narcotine. *Ripe* capsules contain 0·036 per cent. of morphine and 0·056 per cent. of codeine and narcotine. From this it would appear that the amount of morphine decreases while that of the codeine and narcotine increases. It remains to be seen if this is invariably the rule.

Potassium Bitartrate, Preparation of Pure, for Standardizing Volumetric Solutions. P. Carles. (*Journ. Pharm. Chim.* [6], **25**, 333.) Chemists engaged in the cream of tartar industry usually employ as a standard for setting the volumetric alkaline solutions a potassium bitartrate of high grade, containing 99 per cent. of $KHC_4H_4O_6$, purified from $CaC_4H_4O_6$ by digestion in dilute HCl. It is found, however, that this process is unsatisfactory; it is not possible to obtain by it a product containing more than 99·35 per cent. of real $KHC_4H_4O_6$. Precipitating the aqueous solution of the same cream of tartar with $H_2C_2O_4$ gives but little better results; the product containing only 99·5 per cent. of $KHC_4H_4O_6$. The following method gives a pure standard salt:—One hundred Gm. of pure well-formed crystals of $H_2C_4H_4O_6$ is dissolved in about 1 litre of hot water, and divided into two equal volumes. One-half is exactly

neutralized with pure K_2CO_3; the other half is added to the neutral solution. The precipitate of bitartrate which forms on cooling is washed with a little tepid water, redissolved in boiling water and crystallized from porcelain vessels. The crystals are drained, crushed, washed with a little water and dried to constant weight. This pure salt only should be used for standardizing the volumetric alkali employed in cream of tartar.

Pyramidon Hydrochloride and Hydrobromide. C. Astre and P. Aubuoy. (*Bull. Soc. Chim.* [3], **35,** 856.) As ordinarily obtained these salts form oily liquids; the authors have prepared them in a crystalline state by mixing the acid and the base in molecular proportions, both in solution in anhydrous ether. Thus obtained, the *hydrochloride*, $C_{13}H_{17}N_3OHCl$ forms microscopic prisms, m.p. 143–144; very deliquescent. It gives a greenish-blue colour with Mandelin's reagent, passing to bright green on adding excess; a red precipitate with Dragendorff's reagent and with Bouchardat's (KI and I) reagent. With $AgNO_3$ the precipitate of AgCl floats in a violet liquid; the colour is discharged by ammonia. Fe_2Cl_6 gives a blue colour which disappears on boiling. The *hydrobromide*, $C_{13}H_{17}N_3OHBr$, is a white powder composed of microscopic deliquescent lamellae, m.p. 170–171°C.

Quinine Acetyl-Salicylate. L. Santi. (*L'Union Pharm.*, **47,** 491.) Separate solutions in ether are prepared of quinine alkaloid 378, and acetyl-salicylic acid, 180; on mixing, the turbid solution gradually deposits an oily liquid which ultimately crystallizes as a basic salt. The salt $CH_3COO \cdot C_6H_4 \cdot COOH$ $(C_{20}O_2N_2H_{24})$, when dried in the air, is white and stable; m.p. 157°C. Its solubility in water is only 3 : 1,000, in alcohol it dissolves to the extent of 1 : 40. It is used medicinally in doses of 6 grains.

Quinine Formates. P. Guigues. (*Journ. Pharm. Chim.* [6], **24,** 301, and H. Lacroix, *ibid.*, 493.) Guigues states that when quinia is dissolved in excess of dilute formic acid, and the free acid is then neutralized with dilute ammonia, on evaporating the liquid on the water-bath and crystallizing, neutral quinine formate, $C_{20}H_{24}N_2O_2 2CH_2O_2$ is obtained, neutral to phenolphthalein, both acid and alkaline to litmus. This salt

is anhydrous. By exactly neutralizing quinine with formic acid in the cold, adding a strong solution of ammonium formate thereto and crystallizing, basic quinine formate $C_{20}H_{24}N_2O_2$ CH_2O_2, was obtained. It is stable in the air, may be heated to 100°C. without decomposing and is soluble in 20 parts of water. Since it contains 87·56 per cent. of quinine it is the richest of all the salts of that alkaloid and should be useful in therapeutics. Injections with solution of this salt are said to occasion no pain. (See also *Year-Book*, **1906**, 66.)

Lacroix states that when neutral quinine formate is heated as above it loses some of its formic acid at about 50°C. and at 95°C. is decomposed, the residue being merely quinia. The neutral formate is dissociated in water into basic formate and formic acid; the aqueous solution is therefore acid. The basic formate is much more stable and its aqueous solutions are not decomposed even on boiling. The author corrects the m.p. formerly given (*Year-Book*, **1906**, 66) as 132° to 109°C. and the rotation $[\alpha]_D - 141{\cdot}1°$ is altered to 144·2°.

Quinones in Animals and Plants. Brissemoret and R. Combes. (*Bull. Soc. Chim.*, **35**, 603, after *Comptes rend. biolog.*) Except anthraquinones, quinones are not frequently met with in living organisms. Benzoquinone has been isolated in the venom of a Myriapod, *Iulus terrestris*; perezone is met with in several composite plants of the genera *Acourtia* and *Perezia*; and embelic acid from the fruits of *Embelia ribes*. Methyl-dioxynaphthoquinone has been found in *Paxillus atromentosus*; lapachol in *Tecoma speciosa* and lomatol in several species of *Lomantia*, N.O. *Proteaceae*. Juglone has been found in various plants of the N.O. *Juglandaceae*, while an allied quinone has been discovered in many plants of the N.O. *Droseraceae* of the genera *Dionoea*, *Drosera* and *Nepenthes*. (See *Year-Books*, **1886**, 8; **1889**, 150; **1894**, 142.)

Resorcin, Distinctive Test for. A. Carobbio. (*Boll. Chim. Farm.*; *Nouveaux Remèdes*, **23**, 200.) A reagent is prepared by adding to zinc chloride solution sufficient ammonia to redissolve the precipitate at first formed. An ethereal solution of the substance to be tested is prepared and 1 c.c. of the reagent is added thereto, in a test-tube. In the presence of resorcin a yellow ring is formed at the zone of contact which passes from green to bright blue. The same reaction is ob-

tained, but more slowly, with the ammoniacal solutions of zinc or aluminium chloride. Hydroquinone, under similar conditions, *gives at first a yellow ring which changes to chestnut* red, and pyrocatechin gives an immediate pomegranate red colour. (See also *Year Books*, **1889,** 103; **1891,** 130.)

Raphia Wax from the Leaves of Raphia ruffia. A. Haller. (*Comptes rend.*, **144,** 598.) The leaves of the Malagasy palm *Raphia ruffia*, which furnish the well-known raphia fibre, also yield a wax, which, being produced as a by-product in quantity is of commercial interest. The crude wax is of a bright chestnut colour; it is almost insoluble, in the cold, in most organic solvents, but is readily soluble in the same on warming. Boiling benzol is the best solvent. It is not wholly soluble in boiling absolute alcohol, about 10 per cent. of a dark coloured insoluble body being left: the rose-coloured solution assumes a gelatinous consistence on cooling. The substance thus separated is white and pliable when dried, but again acquires its dark colour when melted. A permanently colourless body was not extracted by any solvent. The greater part of the wax is composed of a body having the formula $C_{20}H_{42}O$. In some respects it resembles luzerol; but it melts at 80°C., whereas luzerol has the m.p. 76°C. When acetylized it forms the ester $C_{21}H_{41}OCOCH_3$ which is more soluble than the original alcohol. It also gives the benzoate, $C_{20}H_{41}OCOC_6H_5$ when benzoylated. This is a brown unctuous mass, m.p. 55°C. The original alcohol was found not to be identical with arachic alcohol, m.p. 71°C., although it resembles it in its behaviour with solvents.

Rhazya stricta, Constituents of Leaves of. D. Hooper. (*Pharm. Journ.* [4], **23,** 259.) The leaves of this small tree, growing in Baluchistan, Afghanistan, and Arabia, are used in medicine in India, especially in the Punjab and Sind. The plant is called *Ishwarg*, and the leaves are taken as a bitter tonic for fevers and general debility. It has been reported as poisonous. The leaves have been sent during the year from Baluchistan, where they are given in infantile diseases, for bites of snakes and for tooth and eye diseases. They contain a large quantity of alkaloids, one of which is volatile, and has the odour of conine. The non-volatile alkaloid resembled in some particulars one of the bases of *Aspidiosperma*. It dissolved in

sulphuric acid with a red colour, changing to purple, and contained 8·01 per cent. of nitrogen.

Rheum rhaponticum, Chemistry of the Root of. A. Tschirch and — Cristofoletti. (*Schweiz. Woch. Chem. Pharm.*, **44,** 361.) The coarsely powdered root is extracted first with alcohol 70 per cent., then with alcohol 95 per cent. The residual marc, when shaken with solution of ammonia 5 per cent., still gives a red solution, but this contains only traces of oxymethyl anthraquinones.

Rhaponticin.—The 70 per cent. alcohol extract is evaporated to a syrupy consistence and treated with ether. On setting aside, rhaponticin is precipitated in a crystalline form. This is collected, redissolved in alcohol 70 per cent. and precipitated by addition of water. It is then recrystallized from hot water or dilute alcohol, in the presence of animal charcoal, when it forms colourless, tasteless prisms, $C_{24}H_{24}O_9$, m.p. 231°C. after changing colour at 210°C. It is insoluble in ether; soluble, on heating only, in ethyl and methyl alcohol, acetone, acetic acid and water; also without coloration in alkalies and in Na_2CO_3 solution. It gives a diacetyl, m.p. 138 C. Its acetone solution is coloured blue by Fe_2Cl_6. It slightly reduces Fehling's solution when boiled therewith.

Rhapontigenin.—When cautiously hydrolized by boiling with H_2SO_4 until a turbidity is formed, rapidly cooling the liquid, and shaking out with ether, rhapontigenin $C_{17}H_{22}O_3$ is obtained on evaporating the ether. When purified in solution in dilute methyl alcohol by treatment with animal charcoal it forms crystals m.p. 180–181°C. Readily soluble in ether, acetone, ethyl and methyl alcohol, sparingly soluble in water, insoluble in benzol and in petroleum ether; dissolved without colour in alkalies and alkali carbonates. Its solution in methyl alcohol is coloured green by Fe_2Cl_6. It contains one methoxyl group; it affords a dibenzoyl m.p. 145–146 and a di-acetyl, crystallizing from acetic acid with 1 mol. of the solvent; m.p. 108–110 C.

Free oxymethyl-anthraquinones.—The ethereal liquid after the precipitation of the rhaponticin is evaporated and the residue treated in the cold with Na_2CO_3 solution 10 per cent., which leaves chrysophanic acid insoluble. After recrystallization this is obtained with the m.p. 181–182°C. so that it is not pure, containing 1·48 per cent. of methoxyl. Pure chrysophanic acid free from methoxyl, which might be named chrysophanol, has the m.p. 196°C.

Tetra-hydro-methoxy-chrysophanol.—The above Na_2CO_3 solution, after removing the soluble chrysophanic acid, contains neither rhein nor emodin, but a new body $C_{16}H_{16}O_5$, soluble in toluol, from which solution it is precipitated in golden scales, m.p. 216°C. It contains one methoxyl group and is tetra-hydro-methoxy-chrysophanol or tetra-hydro-methoxydioxy-methyl-anthraquinone.

Anthra-glucosides.—The aqueous solution freed from free oxymethyl-anthraquinones gives, when hydrolized with alcoholic KOH, 3 per cent. glucose, rheum-red, rheonigrin, and a new oxymethyl - anthraquinone, tetrahydro - methyl - chrysophanol $C_{16}H_{16}O_4$ obtained by shaking out with ether the aqueous liquid after the above hydrolysis. Recrystallized from benzol it has the m.p. 195–196°C. It is soluble in chloroform, ether, toluol, benzol and acetone, but only on heating in ethyl and methyl alcohol. It gives a violet colour with alkalies, and red with ammonia ; and is insoluble in alkali carbonates. It forms a diacetyl, in yellow needles, m.p. 205°C. It is not a decomposition product of chrysophanic acid but exists naturally, in the drug, as a glucoside. The lower value of rhapontic rhubarb as a purgative is attributed to the absence of emodin or its glucosides.

Rhubarb, Chinese, Purgative Principles of. E. Gilson. (*Rev. Pharm.*, **22,** 289, 321, 353.) The purgative principles of rhubarb are due to a combination of four glucosides, which has been named *rheopurgarin.* It is not considered to be a mixture, but a definite compound ; but it cannot be isolated without being more or less altered. It is extracted by percolating rhubarb with a menstruum consisting at first of 5 parts by volume of methylic alcohol and 95 parts of ether ; when the amount of extract begins to diminish, the quantity of methyl alcohol is increased another 5 per cent. ; this increase is continued until the solvent finally used contains 40 per cent. of methylic alcohol. After a certain number of extractions a yellow crystalline powder appears when the percolate is concentrated ; from that time all concentration must be conducted *in vacuo.* The bulked concentrations are then set aside and the yellow crystalline precipitate of rheopurgarin collected, washed first with a mixture of methylic alcohol 1 and ether 3, and finally pure ether, and dried *in vacuo* at normal temperatures. It is thus obtained as a bright yellow powder composed of fine

needles. It is odourless but has a distinctly bitter taste ; it is to this that the bitterness of rhubarb is due and not to any other bitter principle. Its behaviour towards solvents is peculiar : although insoluble in water, it is soluble in aqueous solutions of organic acids and of many other organic substances such as tannin, gluco-gallin and gallic acid. This property of dissolving in aqueous solutions of other substances has given rise to the erroneous opinion that the purgative principles of rhubarb are soluble in water and has misled previous investigators. Thus the cathartic acid of Dragendorff and the "primary glucoside" of Aweng (*Year-Book,* **1901,** 161) are mixtures of rheopurgarin and substances which render it soluble in water. Rheopurgarin is gently purgative in doses of 6 to 8 grains. Probably, in natural rhubarb, the presence of mucilage and pectic matter increases its activity. Rheopurgarin consists of four glucosides, *emodin, rhein, chrysophanein* and *rheochrysin.* To separate these advantage is taken of their different behaviour with 2 per cent. Na_2CO_3 solution. Twenty Gm. of rheopurgarin is macerated for 5 days in the cold with 1 litre of this solution. It is then filtered, and the insoluble portion is again treated with 750 c.c. of the same solution for half an hour. It is allowed to stand in a cool place for 24 hours and filtered. These two filtrates, which contain the rhein and emodin, are bulked. On acidifying them with a very slight excess of H_2SO_4 and warming for a short time on the water bath, rhein and emodin are precipitated. The precipitate is collected, washed and dried. *Emodin,* $C_{13}H_{10}O_6$, is extracted from it by treatment with boiling $CHCl_3$. When purified by recrystallization from the same solvent it melts at 256–257. After removing emodin, *rhein* is extracted from the residue insoluble in $CHCl_3$ by treating it with boiling pyridine, and recrystallizing from methylic alcohol. It forms small needles, m.p. 314°C., and has the formula $C_{15}H_8O_6$, as stated by Tschirch and Heuberger, and not $C_{15}H_{10}O_6$ as found by Hesse.

The portion insoluble in the first two treatments with Na_2CO_3 solution, is again extracted by digesting at 70°C. for 45 minutes with the same solvent, which is each time filtered while hot. The filtrates are all kept separate ; after standing a day, they throw down a precipitate, which is collected, washed and dried. The aqueous filtrates are then rendered acid with H_2SO_4, and the precipitates from them are also kept separate. The m.p.s of the products of hydrolysis of the insoluble portions

of the precipitates thrown down by the cooling alkali solution, and of those given by the acid solutions, are then determined. Those which give decomposition products, having a m.p. between 184–186°C., are put together and set aside; those yielding decomposition products with a m.p. 199–201°C. are also bulked and treated as before, with the Na_2CO_3 solution. When no further separation can be effected in this manner the precipitates giving hydrolysis products with the m.p. 184–186°C., which will be found chiefly among the acid solutions, are recrystallized from alcohol 92 per cent., the product being *chrysophanein*, $C_{21}H_{20}O_9$. This glucoside occurs in fine yellow needles which are odourless and tasteless; in solubility it closely approaches rheopurgarin. It melts at 248–249° when heated rapidly; when slowly heated at 242–243°. When hydrolized by boiling with dilute acids it gives dextrose and *chrysophanic acid* according to the equation

$$C_{21}H_{20}O_9 + H_2O = C_{15}H_{10}O_4 + C_6H_{12}O_6$$

Thus obtained, the acid has the m.p. 193–194°C. (uncorr.) and 195–196° in Roth's apparatus. It is believed that this is the first time that this acid has been obtained pure, free from methoxyl impurity which lowers the m.p.

The precipitates which give hydrolysis products having the m.p. 199–200 are continually recrystallized from methylic alcohol until the m.p. of the product of hydrolysis ceases to rise. The result is the new glucoside, *rheochrysin*, which occurs in small yellow needles. Its formula is $C_{22}H_{22}O_{10}$. It is coloured red by NaOH solution, but does not dissolve therein. It resembles chrysophanein in properties and appearance. When hydrolized it yields *rheochrysidin* and dextrose thus—

$$C_{22}H_{22}O_{10} + H_2O = C_{16}H_{12}O_5 + C_6H_{12}O_6$$

Rheochrysidin forms small yellow monoclinic, almost rectangular crystalline scales, m.p. 204°. It is less soluble than chrysophanic acid in most solvents, being most readily dissolved by pyridine. It contains one methoxyl group, and is the body considered by Hesse to be methyl-chrysophanic acid.

Rhubarberon or isoemodin was not found to be present.

Rhubarb, English and French. A. Tschirch, and J. Edner. (*Archiv. der Pharm.*, **245**, 139.) Since the English rhubarb examined was found to contain no rhaponticin, it cannot have

been derived from *Rheum rhaponticum*, for the authors find that species of rhubarb to invariably yield that body. The rhubarb under notice was probably *R. officinale*. It contained chrysophanic acid accompanied by some oxymethyl-chrysophanic acid, as shown by the low m.p. 160°C., chrysophanol having the m.p. 195°C. It also contained emodin and iso-emodin, or rhubarberon.

French rhubarb was found to give rhaponticin, and is doubtless derived from *R. rhaponticum*. It also contained chrysophanic acid, m.p. 183°C., accompanied by less oxymethyl-chrysophanic acid than that of English rhubarb; also chrysopontin $C_{16}H_{16}O_5$, m.p. 214°C., which is probably Gillson's rheochrysidin. French rhubarb contained no emodin nor rhein.

Rhubarb, Valuation of, by Means of Paradiazonitro-aniline. A. Tschirch and J. Edner. (*Archiv. der Pharm.*, **245**, 150.) From 0·5 to 1 Gm. of powdered rhubarb is extracted by boiling with (successive quantities of) dilute alcoholic potash. The bulked solutions are distilled and the residue diluted with water, rendered acid with HCl, and the precipitate, which is thrown down, collected, washed with acid water, and dried. The filter and contents are then extracted in a Soxhlet's apparatus for several hours. This removes the oxymethyl-anthraquinones, leaving the rheotannic acid insoluble. The $CHCl_3$ is distilled off, the residue dissolved by warming with 10 c.c. of 5 per cent. NaOH solution, then being diluted with water 50 c.c. Meanwhile a reagent is prepared by treating para-nitro-aniline 5 Gm. with water 25 c.c., and strong H_2SO_4; after shaking another 100 c.c. of water is added, with a solution of sodium nitrite 3 Gm. in water 25 c.c. The whole is then made up to 500 c.c. Twenty c.c. of this reagent is then added to the above alkaline rhubarb solution with thorough agitation, and HCl is then added drop by drop until the red colour is discharged and an acid reaction obtained. The mixture is then set aside for a few hours, the precipitate is collected on a tared filter, washed free from acid, dried at 70°C., and weighed. The method, which is based on the fact that phenolic bodies are quantitatively precipitated under these conditions, as shown by the equation with chrysophanic acid—

$$C_6H_4(NO_2)N{\cdot}NCl + C_{15}H_8O_2(OH)_2 + 3NaOH$$
$$= [C_6H_4(NO_2)N{\cdot}N{\cdot}C_{15}H_7O_2(ONa)_2] + NaCl + 3H_2O$$

In this 4·47 parts of precipitate =2·54 parts of chrysophanic acid or, in round numbers, 4 5 : 2·5. In the case of rhubarb the quantity of precipitate obtained may be expressed in terms of chrysophanic acid, of which the following mean percentage yields were given with rhubarb of different kinds :—Shensi, 3·2 ; Canton, No. 2, 2·67 ; Canton, round, 4·24 ; Canton, flat, 3·35 ; Shanghai, flat, 2·7 ; Shanghai, 4·14 ; English, 1·5 ; French, 1·25 ; Austrian, 1·6 ; Swiss, 1·2. The two last were determined by the colorimetric method.

Ribes nigrum, Essential Oil of the Buds of. (*Schimmels' Report, April,* **1907,** 106.) Black currant buds from Russia yielded 0·75 per cent. of essential oil ; sp. gr. 0·8741 at 15°C. ; a_D, +2°30′ ; $\eta_{D20°}$, 1·48585 ; acid value, nil ; ester value, 5·6. The oil was pale green, and, from its odour, probably contains cymene.

Ringworm Spores, Method of Staining, for Microscopical Detection. *Lancet,* **1906, 2,** 1565.) Soak the hair in ether for 5 minutes to remove fat. Stain in a solution of 1 part of a 5 per cent. alcoholic of gentian violet, and 3 parts saturated solution of aniline in water. Dry and decolourize with Gram's iodine solution. Clear with aniline oil, wash with xylol, and mount in xylol balsam. The spores are stained blue. A 2 per cent. solution of carbolfuchsin may be used instead of gentian violet, in which case the spores are stained red, and are better for photographing.

Rose, Essential Oil of, Adulterated. E. J. Parry. (*Chem. Drugg.,* **69,** 230.) If otto of rose is distilled *in vacuo,* in a quite different fashion from that usually followed, the resulting otto has characters quite different from those of ordinary otto ; but one of the principal features of this abnormally pure otto is the presence of a large amount of phenyl-ethyl alcohol, so that it can be easily recognized. Directly this fact became known, unscrupulous dealers began describing their otto, mixed with a liberal amount of geraniol and other bodies, as "distilled by a special process," etc., and made vigorous attempts to get adulterated otto accepted as merely abnormal but pure otto.

From the experience of many years' crops, and from samples taken from all over the rose-gathering areas, the conviction is expressed that pure otto of rose never (that is, when distilled in normal Bulgarian fashion) has a specific gravity over about

0·855. It usually falls between the limits 0·850 and 0·853 at 30°C., and anything over this is at once suspicious. Fifteen samples of the worst description examined during the past two or three months are quoted to demonstrate the adulteration that is going on at present (August, 1906). All these samples were offered as pure otto of rose :

Sp. gr. at 30°.	Melting-point.	Optical Rotation.	Refractive Index.
0·880	20°	2° 50′	1·4750
0·877	21°	− 3°	1·4700
0·870	20°	− 2° 40′	1·4680
0·870	20°	− 2° 30′	1·4675
0·869	21°	− 2°	1·4701
0·866	21°	2° 40′	1·4690
0·865	22°	− 1° 50′	1·4672
0·866	21°	− 2°	1·4650
0·871	20°	2° 35′	1·4680
0·870	20°	− 2° 40′	1·4670
0·862	21°	− 3° 20′	1·4675
0·863	21°	− 1° 10′	1·4668
0·866	22°	− 2°	1·4689
0·868	21°	− 2° 30′	1·4690
0·862	21	− 1° 50′	1·4672

It is clear that otto of rose requires careful watching, and those with these high specific gravities, but not containing phenyl-ethyl alcohol, should be rejected.

Rottlerin. H. Thoms and — Herrmann. (*Apoth. Zeit.*, **21**, 804.) Rottlerin, $C_{33}H_{30}O_9$, from kamala, crystallizes in bright yellow needles, m.p. 199–200°C. When oxidized in alkaline solutions with H_2O_2 it furnishes benzoic, cinnamic and acetic acids; when heated to 150–160°C. in alkaline solutions methyl-phloroglucin is formed. Dimethyl-phloroglucin and acetic acid are obtained when it is boiled with zinc dust in 15 per cent. NaOH solution. It is noteworthy that the same decomposition products are also obtained from filicic acid, from malefern, which, like kamala, is used as a vermifuge. (See also *Year-Books*, **1887,** 55; **1888,** 167; **1894,** 165; **1895,** 57; **1900,** 55, 191; **1902,** 187.)

Rue, Algerian and Corsican, Essential Oil of. H. Carette. (*Journ. Pharm. Chim.* [6], **24,** 58.) In Algeria two kinds of rue oil are distilled, known respectively as "essence de rue d'été" and "essence de rue d'hiver," from the seasons of the year at

which the distillations are conducted. In these, two different species of plants are employed: for the summer distillation *Ruta montana* is used; for that conducted in winter, *Ruta bracteosa*. These oils differ markedly in characters and constituents. *Oil of Ruta montana*, or "essence de rue d'été," contains a large amount of methyl-nonyl ketone, so that it becomes solid in winter at temperatures about 5 to 8°C., in this respect resembling the oil of *Ruta graveolens*. *Oil of Ruta bracteosa*, or "essence de rue d'hiver," does not solidify at this temperature, but requires to be reduced to -18°C. before congealing, and remelts at -10°C. The main constituent is methyl-heptyl ketone, and only a small quantity of methyl-nonyl ketone is present.

A specimen of fresh rue sent from Corsica as Corsican rue, also proved to be *Ruta bracteosa*, and not *R. corsica*. This yielded about 0 06 per cent. of oil which congealed at -15°C. and melted at -5°C. It probably consists mainly of methyl-heptyl ketone, and contains a little more methyl-nonyl ketone than the oil of the same plant grown in Algeria. All these oils were soluble in 2 or 3 volumes of alcohol 70 per cent.

In view of the different sources of rue oil, it is suggested that the product should be named from the plant from which it is derived and known as "oil of *Ruta graveolens*," "oil of *Ruta montana*," or "oil of *Ruta bracteosa*," as the case may be. (See also *Year-Books*, **1895,** 133, 169; **1901,** 108; **1902,** 134; **1903,** 150.)

Salamander, Toxic Base from. — Netolitzki. *Nouveaux Remèdes*, **22,** 369.) A poisonous alkaloid has been isolated from the tissues of *Salamandra atra* by extraction with alcohol, purifying with $Pb2C_2H_3O_2$, liberating the base with KOH and shaking out with ether. It has been named samandatrine and forms a crystalline sulphate with the formula $(C_{21}H_{37}N_2O_3)_2H_2SO_4$. It is a powerful poison on both warm and cold-blooded animals. (See also Toad Poison, *Year-Book*, **1903,** 166.)

Salicylic Acid as Natural Constituent of Tomatoes. H. Pellet. (*Annales de Chim. Analyt.*, **12,** 10.) Formente and Scipiotte have shown that salicylic acid is a normal but not constant constituent of Italian tomatoes, which sometimes contain 2 to 3 Mgm. per kilo. The mere positive qualitative reaction for the presence of this acid does not therefore justify the conclusion

that it has been added as a preservative. It was suggested at the International Congress of Applied Chemistry at Rome, in 1906, that the quantitative limit of 10 Mgm. per kilo should be admitted. But the suggestion was not then adopted. The authors advocate this standard for acceptance.

Salicylic Acid, Detection of, in Wines and Preserves. D. Vitali. (*Giornal di Pharm.*; *Répertoire* [3], **19,** 39.) Toluol is the best immiscible solvent for removing salicylic acid in wines and fruit products, since it does not dissolve tannin and colouring matter which may interfere with the Fe_2Cl_6 reaction. The following is a sensitive confirmatory test for salicylic acid:—To a solution of this acid in dilute H_2SO_4 add 1 drop of very dilute colourless $CuSO_4$ solution, and evaporate to dryness. If only a trace of salicylic acid be present, the residue will be bright green.

Salicylic Acid, Some Derivatives of. H. A. D. Jowett and F. L. Pyman. (*Proc. Chem. Soc.*, **22,** 317.) Cinnamoyl salicylic acid, $COOH.C_6H_4.O.CO.CH.CHPh$, was obtained by treating salicylic acid with cinnamoyl chloride; occurs in needles, m.p. 155°C., almost insoluble in water. The quinine salt $C_{16}H_{12}O_4.C_{20}H_{24}O_2N_2$ forms needles, m.p. 169°C.; it is almost insoluble in water. The methyl ester forms large tabular crystals, m.p. 71°C., the ethyl ester occurs in fine needles, m.p. 66–67°C.

Sambunigrin, and other Cyanogenetic Glucosides, further Notes on. E. Bourquelot and H. Hérissey. (*Journ. Pharm. Chim.* [6], **25,** 630.) It has previously been stated that sambunigrin is isomeric with prulaurasin and amygdonitrile-glucoside. It is now found that the phenyl glycollic acid obtained with sambunigrin is the dextro-rotatory form. By the action of very dilute alkali, sambunigrin is isomerized into prulaurasin.

Further investigation of the hexobiose of amydalin shows that this is neither maltose, trehalose, nor gentianose.

Sandal-Wood, Essential Oil of. (*Evans' Analyt. Report*, **1907,** 28.) The solubility test of the Pharmacopoeia, as it is often applied, is not a reliable indication of purity, and it can only be rendered useful by the inclusion of limits of temperature.

Oils of authentic origin distilled in Liverpool during past years,

which have been in stock for some little time, have required a temperature of 21°C. to yield a clear solution in 6 volumes of 70 per cent. alcohol; it is also probable that the solubility is affected by the length of time during which the wood is stored.

The limits of optical rotation given in the Pharmacopoeia are also very often exceeded, especially in oils distilled at a low temperature, or when roots are used. Oils distilled in Liverpool have had α_D −14°36′ and as much as −20°38′.

It is possible, by taking certain technical precautions during distillation, to slightly increase the rotation, but the fact remains that perfectly genuine oils have been distilled which have not satisfied the B.P. requirements as to rotatory power and have required some degree of heat for complete solution in 70 per cent. alcohol.

The santalol content of the authentic oil varies between 93 per cent. and 98 per cent. when estimated with acetic anhydride.

The 94 per cent. limit of the Pharmacopoeia Revision Committee Report is slightly too high.

Sandarac, Constituents of. A. Tschirch and M. Wolff. (*Archiv. Pharm.*, **244,** 684.) When submitted to Tschirch's systematic scheme for the examination of resins, sandarac yields *sandaracinic acid*, $C_{22}H_{34}O_5$; *sandaracinolic acid*, $C_{24}H_{36}O_3$; *sandaracopimaric acid*, $C_{22}H_{30}O_2$, and a resene, *sandaraco resene*, $C_{22}H_{36}O_2$. Sandaracinic acid is removed by repeated shaking out of the ether solution of the resin with aqueous ammonium carbonate solution. It is optically inactive and has no sharp m.p., softening at 180°C., and melting about 186–188°C. Sandaracinolic and sandaracopimaric acids are then removed by shaking out with Na_2CO_3 solution. They are separated from alcoholic solutions by means of lead acetate which precipitates the former, but not the latter. Liberated from the lead salt sandaracinolic acid has no sharp m.p., melting between 265–275°C. Sandaracopimaric acid is crystalline, forming flattened rosettes. It is identical with Henry's isopimaric acid, m.p. about 170°C. (*Year-Book*, **1902,** 136.) In addition to these resins, and volatile oil, sandarac contains a bitter principle.

Santalol. F. W. Semmler and K. Bode. (*Berichte*, **40,** 1124.) Santalol, which is the chief constituent of East

Indian sandalwood oil, is a mixture of several alcohols of the common formula, $C_{15}H_{24}O$, and also possibly a small quantity of another alcohol, $C_{15}H_{26}O$. When treated with acetic and chromic acid the aldehyde, $C_{15}H_{22}O$, is obtained. Santalol is converted into santalyl chloride, $C_{15}H_{23}Cl$, by treatment with PCl_5, and this when reduced with sodium and alcohol, gives the sesquiterpene santalene, $C_{15}H_{24}$.

Scammony Resin, Substitutions, Adulterations, Identification and Testing of. P. Guigues. (*Journ. Pharm. Chim.* [6], **24,** 404, 440, 498.) The author has already (*Year-Books,* **1900,** 152; **1902,** 204) dealt with the fallacy of the ether test, as generally applied, as being useless to detect adulteration. There exists in commerce, moreover, at the present time, scammony resin which naturally contains resin insoluble in ether. This is due to the roots of species of *Convolvulus*, other than *C. scammonia* being used as a source of the resin. The author finds that two kinds of *Convolvulus* yield the ether soluble resin; these are a yellow-flowered species, possibly *C. palcestinus* or *C. stenophylla*, and the true *C. scammonia*, with cream-white flowers having pink bands. Other species stated to furnish commercial scammony are *C. hirsutus* and *C. farinosus*. Two forms of pure scammony resin are met with, one perfectly soluble in pure dry ether in all proportions; the other, soluble in a small volume but partially precipitated on further dilution. The degree of hydration of the ether has an important influence. A specimen of resin extracted from the root by the author gave 23 8 per cent. of insoluble resin with ether containing 0 6 per cent. of water, but only 6 0 per cent. with perfectly dry ether. Again, in the course of the analysis evaporation of the ether causes water condensation; or the resin itself may contain more or less water. Resins prepared from the root by extraction with alcohol contain more or less extractive matter which is distinctly hygroscopic. These resins are generally brownish. A greenish-coloured resin is sometimes met with; the colour of this is due to a trace of iron; "pulled" resin is sometimes put on the market, rendered lighter in colour by imprisoned air. Brown resins normally contain 4 to 5 per cent. of moisture which is slowly given off at 105°C.

Another source of error in the method of manipulation of the ether test, extraction in a Soxhlet apparatus as usually employed, is to be condemned. If brown resins are so treated, the hygro-

scopic extractive forms, with the insoluble resin, a coating round the particles, so that imperfect extraction results. Thus two chemists operating on the same resin, found, respectively, 61·2 per cent. and 3 per cent. of ether-soluble resin; the latter had employed a Soxhlet extractor with boiling ether. The author himself, employing the same resin and the same ether, obtained 71·44 per cent. of ether-soluble resin by cold maceration and only 15·6 per cent. by extraction with boiling ether in a Soxhlet; and even in the last instance there had been a short maceration in the cold, for the ether was poured on to the resin in the Soxhlet percolator.

The only reliable method of extraction is cold maceration with ether. A flask and a filter are tared. From 3 to 4 Gm. of resin is weighed in the first, 30 or 40 c.c. of pure ether is added; the flask is corked and set aside for 5 or 6 hours with occasional rotation; another 30 c.c. of ether is then added, mixed, and, after a few moments' repose, decanted on to the dry tared filter. The insoluble residue is washed on to the filter with more ether; the filter is then dried, first in the air, then in the drying cupboard, and weighed. The amount of ether-soluble resin is thus found by difference. This method is preferable for coloured resins. With pure resins the insoluble residue is collected on the tared filter, as above; the filter is then transferred to a tared nickel capsule or cylinder, such as is used for determining extractive in wines, the last trace of insoluble matter is washed out of the flask with a few c.c. of alcohol, and transferred therewith to the capsule and filter. The alcohol is evaporated and the residue, after drying, weighed as ether-insoluble resin. In interpreting results, account should be taken of the water contained in the resin, which is never done. It is preferable to operate and report on the anhydrous resin.

The mere determination of the proportion of ether-soluble resin is not sufficient, since it would not reveal adulteration with colophony and other foreign resins. The determination of the optical activity of the alcoholic solution of the resin is necessary. With genuine scammony resin this lies between $-18°$ and $-25°$. A higher laevorotation than the last figure points to substitution with other convolvulaceous resins. The α_D is thus determined:—The resin is extracted with alcohol, the solvent is distilled off from the alcoholic filtrate, and the residue while still fluid is washed with successive quantities of warm water until nothing more is dissolved. A quantity

corresponding to 5 Gm. of the dry resin is weighed off and dissolved in 100 c.c. of alcohol. This solution is decolourized with animal charcoal and filtered. The rotation of this filtrate is then taken; at the same time exactly 10 c.c. is measured off and evaporated in a flat nickel capsule, and the residue dried at 105–110 is weighed. From this the exact proportion of resin in 100 c.c. of the solution is calculated, and the a_D found by the usual calculation. Treated in this manner the resin of commercial *Tampico jalap* has the a_D −34°20′; that of *Orizaba jalap, Ipomœa orizabensis,* is −24°45′; of the official jalap, *Exogonium purga,* about −36°; of *Ipomœa turpethum,* of Algerian origin, −31°35′; and of the resin of the root purchased in Paris, −33°53′. The latter resin was entirely soluble in ether, so that the authenticity of the root is doubtful. Of the non-convolvulaceous resins ordinary colophony has the a_D +6° to +7°; sandarac, +31°40′ to +46°20′; Chian mastic, +21°50′ to +29°30′ and guaiacum resin, −17°.

Seminal Stains, Microchemical Reaction for. N. Bokarius. (*Apoth. Zeit.*, **22,** 302; — Levinsohn (*Journ. Pharm. Chim.* [6], **25,** 37.) Bokarius employs either of the following picric acid reagents, which may be used for the microchemical identification of seminal stains. (1) Saturated aqueous solution of picric acid, 25; cadmium iodide, 3; gum acid, 2. (2) Glacial acetic acid, distilled water, equal parts; picric acid, sufficient to make a saturated solution. A drop of the aqueous extract of the stain is placed on a slide, then a drop of either one of the above reagents; after mixing well, the cover glass is put on. With the second reagent the yellow crystals formed are rhombic plates and are generally scattered; those with the first reagent are often crossed and aggregate in a stellate manner. If a drop of strong aqueous solution of phosphotungstic acid be added to a drop of the aqueous extract of the stain on a slide, and examined under a high power, a number of semilunar clear plates will be seen which, under a lower power of 100 diameters, appear as small dark rods. No other substance gives a precipitate at all resembling this. The best results are obtained by adding a little acetic acid to the phosphotungstic acid reagent.

Levinsohn, following Barberio, also uses picric acid, either in the form of a saturated aqueous solution, or as Esbach's reagent. The rhomboidal crystals produced are characteristic of human

seminal fluid to the exclusion of that of other animals, or of other human secretions. The reaction does not depend on the presence of spermatozoa, since it is obtained when these are absent; so that it is probably more correctly a reaction for the human prostatic secretion or that of the seminal vesicles.

Soap, Castile. W. H. Simmons. (*Chem. and Drugg.*, **60, 869.**) Attention is drawn to the useful information to be derived from the determination of the refractive index of the fatty acids of soap.

The following figures yielded by the fatty acids of some of the so-called Castile soaps examined are interesting, and strikingly illustrate the value of this test in conjunction with other data in discriminating between the genuine and adulterated article. Nos. 1 to 9 represent genuine olive-oil soaps; Nos. 10 to 16 all contain coconut oil, while No. 11 consists also very largely of tallow. No. 15 is a particularly poor soap, made entirely from coconut oil, and heavily "liquored," containing only 36·5 per cent. fatty acids:

No.	Titer C.	Neutralization Value.	Iodine No.	Refractive Index No. at 60 C.	Halphen's Test for Cotton Seed.
1 . . .	20·5	202·2	81·2	1·4446	Negative
2 . . .	21·7	196·6	79·1	1·4454	,,
3 . . .	22·9	200·3	78·8	1·4444	,,
4 . . .	22·4	204·0	80·3	1·4446	,,
5 . . .	20·6	198·4	78·0	1·4448	,,
6 . . .	19·7	198·2	78·5	1·4445	,,
7 . . .	22·7	198·9	80·1	1·4450	
8 . . .	22·0	196·6	79·5	1·4442	Negative
9 . . .	22·4	200·2	85·1	1·4445	,,
10 . . .	24·4	228·7	—	1·4394	—
11 . . .	39·5	211·0	40·7	1·4389	Negative
12 . . .	19·8	232·1	17·8	1·4372	,,
13 . . .	20·0	232·9	49·05	1·4371	,,
14 . . .	20·9	227·3	56·7	1·4386	,,
15 . . .	22·6	267·1	10·2	—	—
16 . . .	19·3	227·1	61·0	1·4402	Negative

Thoerner has given the refractive index for olive oil fatty acids at 60°C. as 1·441, but the author found the figure for pure olive oil fatty acids to be invariably over 1·444, and as the refractive indices of coconut oil and tallow fatty acids are con-

siderably lower, the presence of these adulterants is readily detected.

Sodium Salicylate, Quantitative Test for. F. H. Alcock. (*Pharm. Journ.* [4], **23,** 597.) The following is suggested as a quantitative test for this salt :—0 5 Gm. is treated with an equal weight of AmCl dissolved in 10 c.c. of water and evaporated to dryness in a Pt. dish. The dry residue is gently ignited, cooled, dissolved in water and the amount of NaCl determined in the usual manner with N/10 $AgNO_3$ solution. From this the equivalent of $NaC_7H_5O_3$ is calculated.

Spermaceti. (*Southall's Report,* **1907,** 14.) Saponification value determined upon 8 samples, in other respects answering the B.P. requirements ranged between 122·7 and 129·6.

Spermatozoa, Method of Detecting. — Wederhake. (*Zeits. f. Untersuch. Nahr. and Genussmittel* through *Nouveaux Remèdes,* **22,** 536.) The suspected spot is washed out with a little water, or physiological salt solution ; the washings are centrifugated and the sediment collected in about 1 c.c. of liquid. This is treated with 1 drop of tincture of iodine and 2 c.c. of solution of croccin scarlet in alcohol 70 per cent. After standing for a few minutes the deposit is washed and then again separated by centrifugation. The sediment thus obtained is examined under the microscope, when the heads of any spermatozoa present will be seen to be stained red.

Sperm Oil. (*Southall's Report,* **1907,** 14.) Of the 9 samples examined, 7 may fairly be described as normal, the results obtained varying between comparatively small limits.

In 7 normal samples : —Sp. gr. 0 8785 to 0 881 ; saponification value, 122·1 to 126 4 ; iodine value, 81·2 to 87·4 per cent. ; unsaponifiable matter, 37 36 to 39 52 per cent. ; fatty acids, 59·98 to 62·42 per cent.

Of the other 2 samples, No. 1 in all probability contained mineral oil and No. 2 fatty oil :—Sp. gr. No. 1, 0·879 ; No. 2, 0·8945 ; saponification value, No. 1, 102 9 ; No. 2, 137·1 ; iodine value, No. 1, 81·78 per cent. ; No. 2, 93·62 per cent. ; unsaponifiable matter, 48·40 per cent. ; No. 1 ; No. 2, 32·84 per cent. ; fatty acids, No. 1, 50·61 per cent. ; No. 2, 66·12 per cent.

Spices, Ash of. H. Lushring and R. Thamm. (*Analyst,* **31,** 231, 364 ; *Untersuch. Nahr. Genussm.,* **11,** 129 ;

12, 113.) *Pepper.*—The sand-free dry peppers representing Malabar, Tellicherri and Singapore peppercorns gave from 4·67 to 5·02 per cent. of ash, of which from 2·46 to 3·57 per cent. was soluble in water. The alkalinity of the former expressed in c.c. of N/acid per 100 Gm. of pepper was from 15·7 to 28·6; of the latter from 20·5 to 38·3.

Ceylon Cinnamon.—Ash from 4·3 to 5·96 per cent.; water-soluble ash, 1·26 to 1·84 per cent.; alkalinity of water-soluble ash, as above, 11·0 to 18·1; of insoluble ash, 70 5 to 88·6.

Cassia bark.—Ash from 2 36 to 2·37 per cent.; water-soluble ash, 0·90 to 0·96 per cent.; alkalinity of water-soluble ash, as above, 5·95 to 6·14; of water-insoluble ash, 28·6 to 29·4.

Pimentoes.—Ash from 4·25 to 4·86 per cent.; water-soluble ash, 2·25 to 2·8 per cent.; alkalinity of water-soluble ash, as above, 23·3 to 27·9; of water-insoluble ash, 37·9 to 49·8.

Cloves.—Ash from 6·29 to 6·82 per cent.; water-soluble ash, 3·56 to 3 76 per cent.; alkalinity of water-soluble ash, as above, 32·9 to 39 7; of water-insoluble ash, 56·2 to 65·6.

Cardamoms.—Whole fruit. Ash from 3·33 to 7 08 per cent.; water-soluble ash, from 1·10 to 4·46 per cent.; alkalinity of water-soluble ash, as above, 6·6 to 11·2; of water-insoluble ash, 43·9 to 56·0. (See also *Year-Books,* **1887,** 209; **1900,** 407, 409, 415; **1901,** 50, 51; **1902,** 177; **1903,** 244, 245.)

Spike Lavender, Varieties of Essential Oil of. A. Birckenstock. (*Schimmels' Report, October,* **1906,** 73.) Marked differences characterize the pure essential oils of spike lavender grown in different districts, which are grouped accordingly as Ardèche, Hérault, Drôme, Gard, Basses Alpes, Alpes Maritimes and Var. The first-named, Ardèche oil, represents the normal spike type, with the following characters:—Sp. gr. 0·918 to 0·921 at 15°C.; a_D +7°48′ to 9°36′; a_D of first 10 per cent. of distillate, +8° to +10°; esters, 4 to 5 per cent.; alcohols, 21 per cent.; solubility in alcohol 67 per cent., 1 : 3. Var oil more closely approaches the lavender type:—Sp. gr., 0·9035 to 0·905 at 15°C.; a_D −1°10′ to +0; a_D of first 10 per cent. of distillate, +2°; esters, 2 to 3 per cent.; alcohols, 20 to 32 per cent.; solubility in 67 per cent. alcohol, 1 : 5 to 1 : 6. The other groups present intermediate characters. The laevo-rotation of the Var oil is notable, but the author considers this to be normal, and would not reject an oil on this account provided the a_D of the first 10 per cent. of distillate showed a + rotation.

Starch, Rice and Maize, and other Compound Grains, Detection of, in Wheat Flour by Polarized Light. G. Gastine. (*Comptes rend.*, **144**, 35.) The statement met with in text-books that rice starch grains do not polarize light is incorrect. By the following method of treatment they show a very characteristic appearance under the micro-polariscope, especially when the selenite plate is used. This enables the presence of rice, maize, buckwheat, and other foreign starches to be readily demonstrated in wheat flour. A small quantity of the flour is suspended in water, and a drop of the liquid is spread out on a slide. This is cautiously dried so as to avoid sufficient heat to burst the granules; the residue is then completely dehydrated by a brief exposure to 120–130°C., or for a longer time at 100°C. The dry spot is then mounted in Canada balsam and examined by polarized light. Thus treated, *rice starch* shows a brilliant granite-like appearance with the crossed prisms; with the intervention of the selenite plate the compound grains present a characteristic regular rectilinear network of the complementary colours. *Maize starch* shows great variability in the size of the grains, the component granules are regular, but much larger than those of rice. Consequently the coloured network has markedly larger meshes. Millet, darnel, buckwheat and other compound grains, even the very minute ones of the beet, all show characteristic polarization markings when thus treated. The form of the starches of leguminous seeds is quite characteristic. The appearance of masses of wheat starch is quite distinct from that of the true compound grains, the granules having no regularity; the intercrossing lines of colours are therefore very irregular, and showing no symmetry. Starch treated as above fails to show the striae which are observed when it is mounted, without previous dehydration, in glycerin or in water.

Strophanthus Seeds, Modification of the Sulphuric Acid Test for. Gordon Sharp. (*Pharm. Journ.* [4], 23, 258.) The failure to obtain satisfactory results with the official test, due to variation in the strength of the acid and temperature, may be obviated by the following method of procedure :—Cut a strophanthus seed into 4 pieces, and place on a white porcelain dish in which are 20 minims of the B.P. dilute H_2SO_4. Let stand for 1 minute; next whisk the dish in the flame of a spirit lamp or a Bunsen burner. In half a minute, if the seed is genuine, the dark green colour will appear at the extreme edge of the fluid, where the

highest degree of concentration has taken place. In a few seconds the green colour is seen over the whole field, and if the heat be continued the green is followed by red, garnet-red, and finally black. Strong H_2SO_4 must not be used. The same method gives better results in many cases for obtaining characteristic colour reactions with glucosides and H_2SO_4 than the usual process of applying the strong acid.

Strychnine and Brucine, Modified Method for Separating by the HNO_3 Method. M. H. Webster and R. C. Pursel. (*Amer. Drugg.*, **49**, 362.) Concordant results are obtained by the addition of sodium nitrite to the acid mixture, thus ensuring, under all ordinary conditions, the elimination of the brucine by oxidation, but not affecting the strychnine. It is also stated that this modified process is not affected by the purity of the alkaloids, as is the case when pure nitric acid, sp. gr., 1·40, is employed. Applying the process to the U.S.P. method for the standardization of the fluid extract of nux vomica, the mixed alkaloidals from 10 c.c. of the extract are dissolved in 15 c.c. of 3 per cent. sulphuric acid. To this solution 3 c.c. of a mixture of equal volumes of nitric acid, sp. gr. 1·4, and water is added, then 1 c.c. of 5 per cent. aqueous solution of sodium nitrite; after agitation the mixture is set aside for exactly 30 minutes. It is then made alkaline, and the strychnine is shaken out with chloroform in the usual manner.

Many modifications have been suggested for the separation of strychnine and brucine by the HNO_3 method which do not appear to have given uniform results. (See following abstract.)

Strychnine, Determination, Unreliability of the U.S.P. Process for. H. M. Gordin. (*Amer. Journ. Pharm.*, **79**, 61.) It is shown that the substitution of HNO_3, sp. gr. 1·400 for the acid, sp. gr., 1·420, originally directed by the author to be used for the elimination of brucine (*Year-Book*, **1903**, 160) and the omission of the use of amyl alcohol to obviate spurting during the drying of the alkaloid, render an otherwise reliable process quite useless. These unwarranted modifications are strongly protested against, and the value of the method, as originally given, is maintained.

Strychnos Seeds, Glucosides in. J. Laurent. (*Journ. Pharm. Chim.*, **25**, 225.) By treating the alcoholic extract of

the seeds, various species of *Strychnos*, by the method of Bourquelot (*Year-Book*, **1906**, 69), the successive fermentative action of invertin and emulsin showed the presence of saccharose and glucosides. In view of the fact that Dunstan and Short (*Year-Book*, **1884**, 81) have shown that the glucoside loganin occurs in the fruit of *S. nux vomica* in quantity, this result is not surprising. The results of the investigations of the author are given as follows :

Species.	Original Reducing Sugar.	Saccharose.	Reducing Sugar produced by Emulsin.
S. nux vomica .	0·22 per cent.	1·34 per cent.	Not determined.
S. ignatia . .	1·58 ,,	8·6 ,,	1·30 per cent.
S. potatorum .	0·2 ,,	1·22 ,,	None.
S. spinosa . .	0·6 ,,	1·70 ,,	None.
S. bakanko . .	1·32 ,,	1·70 ,,	0·52 (?)

It is evident that the seeds of *S. nux vomica*, *S. ignatia*, and probably *S. bakanko* contain one or more glucosides which are hydrolized by emulsin. Dunstan and Short have not observed the action of that ferment on loganin. The author finds that this action is much slower in the case of the *Strychnos* glucoside than with those usually hydrolized by emulsin, requiring 15 days at 28°C. for completion ; it is generally completed in 3 days.

Sugars, Reducing, Colour Reaction of, with Meta-dinitrobenzene. Chavassieu and Morel. (*Comptes rend.*, **143,** 966 ; *Journ. Pharm. Chim.* [6], **25,** 88.) In strongly alkaline solutions meta-dinitrobenzene gives a violet colour with aldehydic and ketonic sugars, which is changed to yellow by mineral acids. Simple aldehydes and ketones give a red colour which may mask the sugar reaction. Albumin, albumoses, amide acids, urea and creatine do not affect the reaction. Saccharose and glycogen give no reaction ; maltose, lactose, dextrose, galactose and arabinose react in 15 minutes, levulose gives an intense colour in 2 minutes.

Sulphonal, Detection of, in Trional and Tetronal. E. Gambutti. (*Journ. Pharm. Chim.* [6], **25,** 683.) Since sulphonal is very much cheaper than either trional or tetronal, and the sulphone reactions are not very distinctive, sulphonal is likely to be used as an adulterant of the more costly drugs.

It may be readily detected, however, in a mixture of these bodies in consequence of its relative insolubility in ether; its solubility therein is only 1 : 133; while that of trional is 1 : 15·37, and of tetronal, 1 : 9·83 at 15°C. Therefore 10 c.c. of ether will completely dissolve 1 Gm. of tetronal or 0·5 Gm. of trional, but will dissolve only 0·07 Gm. of sulphonal. Consequently by treating a mixture of these sulphones with a small volume of ether, sulphonal may be easily separated and identified by its m.p. and reactions. Another means of detection lies in the microscopic form of the crystals left by the evaporation of the ether solution. Sulphonal forms fern-leaf crystals resembling those of magnesium ammonio-phosphate. Trional gives rectangular tablets, and tetronal fibro radiated, almost round groups of needles resembling those of urea oxalate.

Sulphur, Determination of, in Alimentary Substances. J. Balland. (*Journ. Pharm. Chim.* [6], **25,** 49.) The ordinary method of determining sulphur in the ash of food-stuffs is unsatisfactory, for by the usual methods of incineration a considerable loss is incurred by volatilization. The following method obviates this error:—Ten Gm. of the material is moistened in a Pt. capsule with 1 per cent. solution of pure K_2SO_3, free from sulphate, dried, and gently ashed. The ash is treated with a slight excess of dilute HNO_3, then with distilled water, and filtered so as to obtain, after washing, from 30 to 40 c.c. of liquid. The sulphate is then precipitated in the usual manner as $BaSO_4$, and the equivalent of sulphur calculated. The amount of sulphur found by this method in commercial cereals ranges from 0·027 to 0·046 per cent.; being a little higher in oats and buckwheat than in other grain. Among vegetables, carrots contain the least, 0·092 per cent., and leeks the most, 0·397 per cent. Among dried leguminous seeds Mayotte beans contain the most, 0·180 per cent., and Moravian lentils the least, 0·030 per cent. Fresh apricots contain 0·021 per cent.; peaches, 0·114 per cent., and other fruits amounts of sulphur intermediate between these quantities.

Sulphurous Acid, Convenient Method of Preparing. F. L. Cheney. (*Amer. Journ. Pharm.*, **78,** 333.) Sulphurous acid may be conveniently prepared as follows:—Dry $NaHSO_3$, 5·7 Gm.; dilute HCl, 18·5 c.c.; water, 25 c.c.. Add the acid to the salt, placed in an 8-ounce glass-stoppered bottle; set aside,

and when effervescence ceases, add the water. The product should measure 40 c.c., and contain from 6·0 to 6·5 per cent. of SO_2.

Syringin, the Glucoside of Syringa and Ligustrum. J. Vintilesco. (*Journ. Pharm. Chim.* [6], **24,** 145.) By employing the process of Bourquelot and Danjou (*Year-Book,* **1906,** 70) for the isolation of sambunigrin, the author has succeeded in separating syringin in a pure crystalline condition from the bark and leaves of various species of *Syringa* and privet. The formula attributed to it by Koerner, $C_{17}H_{24}O_2$, is confirmed. It is laevorotatory, $a_D = -17°$, and is completely hydrolized by emulsin into dextrose and syringenin.

$$C_{17}H_{24}O_9 + H_2O = C_{11}H_{14}O_4 + C_6H_{12}.O_6.$$

As syringenin is insoluble, it carries down a portion of the emulsin, so that to obtain complete hydrolysis it is necessary to add more of the ferment. In both lilacs and privets syringin is accompanied by sucrose and reducing sugars in the bark and leaves. The leaves contain more of the glucoside than the bark. The proportion varies with different species, and also in the same species at different seasons of the year. It is found in considerable amount in the winter leaves of privet, and tends to disappear when these leaves are about to fall. It appears to be a reserve material, like sucrose, for the nourishment of the plant. In *white lilac* 1·16 per cent. was found in the bark in February; 1·5 per cent. in the leaves, 0 334 in the wood, and 2·154 in the bark of another shrub, in April, the percentage being calculated on the fresh organs. *Persian lilac* gave in May 3·072 per cent. in the leaves, and 2·229 per cent. in the flowers.

Ligustrum vulgare gave the following percentages:—Leaves, 1·53; bark, 0·96 per cent. in March; old leaves, 0·232; young leaves, 1·602 per cent. in May. *L. japonicum* gave:—Leaves 2·354 per cent. in March; old leaves, 0·967; new leaves, 3·6 per cent. in May. *L. spicatum*:—Leaves, 2·889; bark, 0·781 per cent. in February. *L. lucidum*:—Leaves, 3·634; bark, 1·461 in January; old leaves, 1·904; young leaves, 2 604 per cent. in May.

Syrups and Preserves, Methods for Examining in French Official Laboratories. *Annales de Chim. Analyt.*, **12,** 255.) *Detection of glucose and dextrin.*—Ordinary saccharimetric

determinations which show a notable predominance of glucose over laevulose points to the presence of added glucose. Glucose is added in these instances in the form of crystal syrup, which also contains dextrin; the latter may be detected thus:—Ten Gm. of a fruit preserve or 20 Gm. of syrup are mixed with tepid water in a graduated 100 c.c. flask; 2 Gm. of $CaCO_3$ is then added, suspended in a little water; after well mixing 2·5 c.c. of saturated solution of $Pb2C_2H_3O_2$ is added and the volume is made up to 100 c.c. After mixing and filtering 50 c.c. of the clear filtrate is evaporated to a syrup on the water-bath; when this has cooled to about 50°C., 3 or 4 c.c. of pure HCl is added. The liquid thus obtained is then poured, drop by drop, with constant stirring into 50 c.c. of 90 per cent. alcohol. After standing for 2 or 3 hours the liquid is decanted through a filter, the residue is washed with alcohol, then redissolved in water and made up to 50 c.c., shaken with a little animal charcoal, filtered and polarized. A strong dextro-rotation denotes dextrin. To confirm this a double quantity of the substance is treated as before, and 100 c.c. of the filtrate corresponding to 10 Gm. of preserve or 20 Gm. of syrup is collected. Forty c.c. of this is treated with 4 c.c. of HCl and gradually heated on the water-bath so that it reaches 67–68°C. in 10 to 12 minutes when the saccharose will be inverted. The liquid is cooled, 4 c.c. of strong NaOH solution is added, and the volume is made up to 50 c.c. In this the total reducing sugar is determined with Fehling's solution; the result, $\times 1{\cdot}25$, gives the total reducing sugar and inverted saccharose in 4 Gm. of preserve or 8 Gm. of syrup, and from this the quantity in 5 or 10 Gm. respectively is calculated. Fifty c.c. of the original filtrate is then treated either with 0·5 c.c., H_2SO_4, and heated in an autoclave for an hour at 110°C., or with 0·5 c.c. of HCl and heated for 3 hours under an upright condenser. After either of these methods of inversion, the liquid is cooled, saturated with 0·5 c.c. of strong NaOH solution made up to 50 c.c. and the amount of reducing sugar determined with Fehling's solution. The difference in the two determinations $\times 0{\cdot}9$ gives the amount of dextrin in 5 Gm. of preserve or 10 Gm. of syrup.

Detection of gelatin.—About 30 Gm. of the material is treated with a little water and precipitated with alcohol; the precipitate is divided into 2 parts; one is heated in a test-tube with CaO and NaOH, a marked evolution of NH_3 occurs if gelatin be present. The other portion is dissolved and tested with tannin

and picric acid which give precipitates with gelatin. The amount of gelatin present may be determined by Trillat's method. Twenty-five Gm. of the material is extracted with water and filtered ; the filtrate is evaporated to a thick syrup which is then intimately mixed with 5 c.c. of 10 per cent. formaldehyde solution. The mixture is evaporated on the water-bath as low as possible, which renders any albuminous matter insoluble. It is then treated with boiling water either made acid or alkaline, as required, as long as anything is dissolved ; the gelatine formalin compound remains as a transparent residue attached to the bottom of the capsule.

Detection of gelose and agar agar.—Agar agar frequently contains diatoms, such as *Arachnoidiscus japonicus.* The frustules of these may be detected as follows :—One hundred Gm. of the material is heated with 500 c.c. of water and 5 c.c. of H_2SO_4 and strained through a coarse cloth. The strained liquor is allowed to deposit, and the sediment is collected on a filter and dried, and ashed with a mixture of H_2SO_4, 1 part, HNO_3, 3 parts. The ash left is examined microscopically for diatoms. The same result may be obtained more quickly by heating 10 Gm. of the material with 2 c.c. of HCl until perfectly liquid; the product is then centrifugated and the deposit examined as before. Some geloses do not contain diatoms. These must be detected as follows :—Thirty Gm. of the material is heated for a few moments on the water-bath with 10 c.c. of water ; 150 c.c. of alcohol 95 per cent. is then mixed in, and the whole is set aside for 12 hours. The liquid portion is decanted and rejected. The precipitate is taken up with 50 c.c. of water and boiled. Ca2(OH) solution is then added to distinct alkalinity and the liquid is boiled ; the calcium pectinate precipitated is strained out through a cloth, and the strained liquid neutralized, with a slight tendency to alkalinity, with dilute oxalic acid solution. This is then evaporated to dryness and treated with 2 c.c. of formalin to render any gelatin present insoluble ; after thorough mixing, the mass is again taken to dryness, boiled with 50 c.c. of water and filtered. The filtrate is evaporated to 6 or 8 c.c. If gelose is present this will set to a jelly when cold.

Detection of tartaric acid.—Tartaric acid in quantity is not a normal constituent in fruits generally used for jams, so its presence may be regarded as indicating fraudulent admixtures. To detect it 50 Gm. of the material is extracted several times in succession with 200 c.c. of alcohol 95 per cent. The alcoholic

solution is filtered, distilled, and the residue evaporated to dryness on the water-bath. This is then taken up with distilled water, rendered faintly alkaline with AmOH, treated with $CaCl_2$ solution and boiled; after cooling the precipitate is separated by decantation and dissolved by boiling water in presence of just sufficient K_2CO_3 to impart a faint alkalinity; the precipitated $CaCO_3$ is removed by filtration. The filtrate, rendered acid with $HC_2H_3O_2$, is made up to 100 c.c. Twenty-five c.c. of this is treated with equal volumes of alcohol and ether, which precipitates any $KHC_4H_4O_6$ present. In this the tartaric acid may be titrated in the usual manner.

Tannins, Differentiation of Catechu Tannins from Pyrogallol Tannins by Means of Formaldehyde. F. Jean and C. Frabot. (*Annales de Chim. Analyt.*, **12**, 49.) Formaldehyde solution gives, when heated on the water-bath, in the presence of hydrochloric acid, a dense precipitate with tannins of the catechu tannic acid group, the tannin being thrown down quantitatively; while with pyrogallol tannins, under similar conditions, no precipitate is formed. The method therefore serves to detect the presence of one in the other, such as the adulteration of sumach with lentiscus. It is also available for the quantitative determination of tannins of the catechu group, giving concordant results which are slightly higher than those obtained by the dried hide-powder method. Since the difference in the molecular weight of the complex molecule of the tannin and that of its formaldehyde compound is only 12, for all practical purposes this may be disregarded, and the precipitate may be collected, dried and weighed as tannin.

The following commercial tanning materials give precipitates with formaldehyde solution when heated with HCl:—Oak bark, mangrove, canaigre, lentiscus, gambier, quebracho, mimosa, palmetto, mallet bark, fir, larch, Chinese galls, hemlock spruce. Among those which do not give precipitates are—Sumach, barberry, chestnut, campeachy, divi-divi, myrobolans, valonia, tamarisk, oakwood, and acanthus.

Taxus baccata, Presence of Raffinose in. H. Herissey and C. Lefebvre. (*Journ. Pharm. Chim.* [6], **25**, 507.) Raffinose is present in the young shoots and leaves of the yew. The alcoholic extract of these, previously freed from taxacatin and purified, was treated with barium hydrate, and the barium

raffinose compound precipitated with alcohol. This is the first recorded instance of raffinose occurring in a conifer.

Tephrosia vogelii, Active Principles of. M. Hanriot. (*Comptes rend.*, **144,** 150, 498.) The crushed fresh leaves of *Tephrosia vogelii* are employed in Madagascar and in East Africa as a fish poison. On distilling the alcoholic extract of the leaves with steam an odorous volatile oil separates from the aqueous distillate and more is obtained by shaking out with ether. This has been named *tephrosal*, $C_{10}H_{16}O$. It has the properties of an aldehyde and is very slightly, if at all, toxic. The residue after distillation is then extracted with $CHCl_3$; the solution thus obtained is treated with 2 volumes of Et_2O and filtered from precipitate formed. The filtrate is shaken with KOH which removes a resinoid impurity; the Et_2O is separated and distilled off and the residue recrystallized from acetone and washed with ether. The product, *tephrosin*, $C_{31}H_{26}O_{10}$, occurs in colourless crystals, m.p. 187°C., distilling *in vacuo* without alteration. Almost insoluble in water and in alcohol, its best solvents are acetone and chloroform: it is not a glucoside and is insoluble in alkalies. It is extremely poisonous to fish, a solution 1 : 50,000,000 killing a roach in $1\frac{3}{4}$ hours, and this did not exhaust the toxicity, for other fish introduced into the same liquid were as quickly killed. Animals appear to be quite unaffected by the poison; rabbits eat the leaves with impunity and dogs show no inconvenience after doses of 1 Gm.

Terebene, Official Requirements for. (*Southall's Report*, **1907,** 33.) The official requirements for terebene cannot be met in practice. Two lots recently prepared from American turpentine oil had the following characters:—Sp. gr. 0 853 and 0·956; distillate below 165°C., 1 per cent. in each; distillate between 165–180°C., 97 and 92 per cent.

Textile Material, Method of Differentiating the Threads of. O. Lecomte. (*Journ. Pharm. Chim.* [6], **24,** 447.) It is sometimes necessary to distinguish, for counting, the component threads in woven textile fabric rather than to determine the amount of these by weight. For instance, in Persia, the Customs regulations require a statement as to the constitution of material in the number of threads of wool, silk, or vegetable fibre, in the warp and woof of a given area. The following method for

effecting this differentiation is based on the fact that silk and wool possess an amidogen group so that they can be diazotized; the diazo compound formed unites with phenols. Wool, besides this, contains sulphur which forms black PbS with an alkaline plumbite.

The following reagents are prepared:—*Dilute nitric acid*, pure nitric acid 100 Gm., water to make 1 litre. *Sodium nitrite solution*, sodium nitrite 50 Gm., water to make 1 litre. *Alkaline solution of sodium plumbite and naphthalate*, solution of basic lead acetate, 25 Gm.; caustic soda, 50 Gm.; β-naphthol, 5 Gm., water to make 1 litre. Dissolve the caustic soda in 500 c.c. of the water; add the basic lead acetate previously diluted with 300 c.c. of water solution to this gradually, with constant agitation. When the precipitate at first formed has dissolved add the β-naphthol and again shake until a clear solution results. Make up to volume and store in the dark. *Alkaline solution of sodium plumbite and resorcinate.*—Prepared as above, substituting 2 Gm. of resorcin for the 5 Gm. of β-naphthol. *Dilute hydrochloric acid.*—Pure hydrochloric acid, 5 Gm.; water to make 1 litre. One square decimetre of the bleached fabric is thoroughly moistened in 30 c.c. of the dilute nitric acid, the tissue being well worked with a glass rod. When thoroughly moistened 30 c.c. of the sodium nitrite is slowly added taking 3 minutes, and constantly agitating the whole time. After the whole has been added, stirring and working the fabric is continued from time to time. At the expiration of 10 minutes the diazolizing will be complete. The fabric is pressed out and thrown into 5 litres of water, rapidly washed for 2 minutes, drained and cut into two equal parts. One of these is macerated in 40 c.c. of the alkaline solution of sodium plumbite and naptholate; the other in the resorcinate solution. This should be done at a temperature not exceeding 20°C. After frequent agitation during an hour the two pieces of stuff are withdrawn, washed in running water for 15 minutes, and immersed for 5 minutes in 100 c.c. of the dilute hydrochloric acid solution. They are then washed in running water for an hour, drained, pressed between filter paper and dried in the shade.

In the portion treated by the naphtholate reagent *silk* threads appear rose-red; *wool* fibres, black; and vegetable fibres, white. The piece treated with resorcinate reagent shows the *silk* threads as orange, the *wool* as black, and vegetable fibres white.

Thuja plicata, Essential Oil of. W. C. Bleasdale (*Journ. Amer. Chem. Soc.*, **1907, 29,** 539.) The essential oil of *Thuja plicata*, the Pacific *Arbor vitae*, locally known as red or canoe cedar, does not appear to have been previously distilled or examined. The oil from the air-dry foliage, obtained by steam distillation, was dark in colour and had a penetrating terpene-like odour. Sp. gr. 0·8997 at 15°C.; α_D + 1°45′. On fractional distillation the chief fraction was found to be thujone except that it was laevorotatory instead of dextrorotatory. The wood, when distilled, yielded no oil; but the aqueous distillate when shaken out with petroleum ether gave a white crystalline body, m.p. 80°C., possessing the characteristic odour of the wood. To this the formula, $C_{10}H_{12}O_2$ has been provisionally attributed.

"Thyme Lemon," Essential Oil of. E. J. Parry and C. T. Bennett. (*Chem. and Drugg.*, **69,** 481.) A small sample of essential oil distilled in the South of Spain and sent over to this country under the above name has been examined. The oil is of a yellow colour, and has an odour recalling that of thyme but with a strong flavour of lemon, differing in this respect from the oil derived from *Thymus serpyllum* (wild thyme). The latter oil also differs in being laevorotatory. The following are the chief characters of the sample examined:—Sp. gr. at 15°C., 0·901; optical rotation in 100 mm. tube, +18°30′; aldehydes (principally citral), 20 per cent.; proportion absorbed by 5 per cent. potash solution, 10 per cent.; refractive index at 19°C., 1·4808; refractive index of first 80 per cent. distilled, 1·4779; refractive index of 20 per cent. residue, 1·4980. The portion absorbed by KOH solution on separation proved to be somewhat resinous, and gave only a feeble phenol reaction with ferric chloride. A small portion of the oil was fractionated in order to give some idea of its possible constituents. The results were as follows:

Below 175°C.	Nothing distilled.
Between 175° and 180°C.	10 per cent. was collected.
180° and 190°C.	13 " " " "
190 and 200°C.	11 " " " "
200° and 210°C.	12 " " " "
210° and 220°C.	18 " " " "
220° and 230°C.	18 " " " "
Above 230°C.	18 " " residue.

These results appear to indicate that pinene is probably absent

and that the terpene present is limonene. The high boiling-point of the residual fraction, which has a refractive index of about 1·500, points to the presence of a sesquiterpene. The oil is not soluble in 70 per cent. alcohol (ten volumes), but dissolves in two volumes of 80 per cent. alcohol.

It is suggested by the distillers that the plant used for distillation is the true vervain, *Lippia citriodora*, but this is open to doubt, as vervain oil has usually a laevorotation and contains a higher percentage of citral. Moreover, it is less soluble. It is, however, rarely found in commerce, and is liable to variation according to the country of origin and method of distillation. The following figures have been published for oil of *Lippia citriodora* :

	Schimmel.		Umney.
Specific gravity .	0·900	0·902	0·894
Optical rotation .	—12° 38′	—12°7′	—16°
Aldehyde (citral)	35 per cent.	28 per cent.	74 per cent.

Thymol Iodide, Preparation of. F. E. Niece. (*Amer. Journ. Pharm.*, **78,** 378.) Thymol, 1 oz. ; potassium hydroxide, 1 oz. ; potassium iodide, 1 oz. ; iodine, ½ oz. Dissolve the KOH in 16 fl. oz. of warm water, and dissolve the thymol, which should be very finely powdered, in this solution ; then dissolve the KI in 16 fl. oz., and the iodine in this solution. Mix these and allow to stand for a time. Add 1 lb. of chlorinated lime to 1 gallon, 4 pints, 16 fl. oz. of water, and pass chlorine into the solution for a few minutes. Place this solution in a large earthen vessel, and add the combined solutions previously referred to, mixing well by constant stirring. In a few minutes a copious reddish-brown precipitate will form, which should be allowed to completely settle, then wash with large quantities of water acidulated with HCl, 6 oz. of acid to 6 pints, 8 fl. oz. of water. This frees the precipitate from excess of lime and alkalies. Wash with pure water until free from acid. Dry below 98°F. The yield should be from 4 to 5 oz.

Toxicological Isolation of New Remedies. T. Panzer. (*Répertoire* [3], **18,** 371.) The alcoholic tartaric acid solution, obtained in the course of the Stas-Otto toxicological process, is shaken out with ether ; this ether, when evaporated, leaves a residue (I). The original alcoholic solution is then made alkaline with AmOH and again shaken out with ether, which on evaporation gives a residue (II). The alkaline liquid is then made

acid with HCl, again made alkaline with AmOH, and shaken out first with ether, from which the residue (III) is obtained, then with amylic alcohol, which on evaporation gives a residue (IV). The following substances are found in the first residue (I) :—Sulphonal, trional, veronal, hedonal, aspirine, salipyrine, acetopyrine and antifebrine. In the second residue (II)—pyramidon, antifebrine, which is also found in (I). Antipyrine and phenacetine are found in the last residue (IV). Pyramidon, antipyrine, phenacetine and antifebrine may be detected when 5 Gm. are present in 500 Gm. of the organs ; antifebrine disappears in the course of a few days, but the other bodies are more permanent. It should be borne in mind that these bodies are generally given in much larger doses than the vegetable alkaloids, and that in some cases they are met with in all the extract residues ; as a rule they do not give alkaloidal reactions. Generally they are easily purified, often mere recrystallization from hot water is sufficient. They may be identified by their m.p.s and general reactions.

Tuberculine, a Poisonous Alkaloid from Tubercle Bacilli. G. Baudran. (*Schweiz. Woch.*, **44,** 635.) A base crystallizing in fine minute needles has been extracted from dried tubercle bacilli by the process employed for isolating ergotinine from ergot. It has been named tuberculine. [Not to be confused with Koch's tuberculin.—Ed. *Year-Book.*] Its ether solution, when treated with nitrous H_2SO_4, develops a red colour changing to violet on standing. It is a strong base giving stable soluble salts. The poisonous action is much more rapid on tubercular guinea-pigs than on healthy rodents ; a fatal result attending the injection of 0·8 Mgrm. in 8 to 15 days with the latter, and in 12 to 18 hours with the former. When oxidized with $CaMnO_4$ a product named antituberculine is obtained which is virtually devoid of toxicity. Animals treated with this are stated to be rendered immune against subsequent injection from human or bovine tuberculous matter. The injections are painless and quite harmless.

Turtle Oil. C. E. Sage. (*Chem. and Drugg.*, **69,** 691.) A consignment of turtle oil recently examined had the following characters : –Sp. gr. at 25°C., 0·9192 ; $\eta_{D30°}$; 1·4677 : $\eta_{D50°}$ 1·4665 ; acid value, 1·1 ; saponification value, 211·3 ; iodine value, 111·0 ; m.p., 24–25°C. ; solidifying point, 19–18°C. ;

Reichert Woolny value, 4·84. The colour of the fat was yellow, the consistence, odour and taste resembling that of soft beef dripping. [Turtle fat has been imported several times in previous years, and has been suggested as a substitute for cod-liver oil. But the peculiar subtle and nauseous reptilian odour and taste of these consignments, although carefully preserved in bottles, precluded any possibility of their use, in Europe, for medicinal or dietetic purposes.—Ed. *Year-Book.*]

Uric Acid, Detection of, in Urinary Sediments and Calculi. E. Leturc. (*Répertoire* [3], **19,** 248.) Moreigne's reagent, prepared as indicated, is employed to detect uric acid in calculi and sediments. Pure sodium tungstate, 20, is dissolved in phosphoric acid, sp. gr. 1·130, 10, and water, 100; the solution is boiled for 20 minutes, the water evaporated being made up, and then acidified with HCl. In the case of a calculus this is divided transversely and a small quantity scraped to a powder. A few particles are warmed in about 1 c.c. of distilled water, until dissolved; 2 c.c. of the reagent is added, followed by 1 or 2 drops of NaOH solution. In the presence of uric acid a fine blue colour is produced. The reaction will detect the acid in a solution of 1 : 100,000. It may be employed quantitatively for colorimetric determination.

Urine Analysis, Source of Error with Esbach's Reagent. J. Haeussermann. (*Journ. Pharm. Elsass. Lothring.; Nouveaux Remèdes,* **23,** 183.) It is pointed out that the urine of a patient to whom potassium salts have been administered may give a copious precipitate of potassium picrate, with Esbach's reagent, although it may be quite free from albumin. The precipitate of the potassium salt is readily distinguished from that given by albumin, since the former is seen to be crystalline and the latter amorphous, when examined microscopically.

Urine, Collection of Deposit of Organized Elements for Microscopic Examination. (*Journ. Pharm. Chim.* [6], **24,** 551.) If possible the deposit should be collected by natural subsidence rather than by centrifugation, for the latter is apt to break up or distort certain organized elements. To obtain a good deposit the urine should not be allowed to ferment. C. Gaillard recommends the addition of 5 per cent. by volume of Mueller's reagent to prevent this fermentation and to fix the organic ele-

ments. Mueller's reagent consists of $Na_2SO_4 10H_2O$, 10; $K_4Cr_2O_7$, 25; H_2O, 100.

Urine, Detection of Acetone in. (*Journ. Pharm. Chim.* [6], **24**, 549.) Frommer detects the presence of acetone in urine by the following colour reaction:—Ten c.c. of the urine is treated with 1 Gm. of KOH and before this has dissolved, 10 or 15 drops of 10 per cent. alcoholic solution of salicylic aldehyde is added, and the tube is warmed without mixing to about 70°C. If acetone be present a purple-red ring is formed round the KOH. (See also *Year-Book*, **1904**, 177.)

Urine, Detection of Acetylacetic Acid in. (*Journ. Pharm. Chim.* [6], **24**, 550.) Otto Mayer employs the following method:—A few c.c. of a mixture of 5 c.c. of Fe_2Cl_6 solution in 95 c.c. of saturated solution of NaCl are introduced into a test-tube, and an equal volume of the urine is floated on the surface. In presence of acetylacetic acid a wine-red ring is formed at the zone of contact.

S. Bondi adds a solution of iodine to a little of the urine and warms; when in the presence of acetylacetic acid a persistent orange-red colour is formed, and on boiling the characteristic penetrating odour of iodoacetone is evident. The urine should be neutral or faintly acid. The presence of acetone or of β-oxybutyric acid does not affect the result.

Urine, Detection of Albumin in, with Paranitrobenzaldehyde. E. Rohde. (*Merck's Jahresberichte*, **20**, 199.) On adding paranitrobenzaldehyde to urine and shaking up with strong H_2SO_4, an intense permanent green colour is given if albumin is present. Steensma boils the urine with a little solid paranitrobenzaldehyde and strong HCl; a green colour is produced which is changed to fine dark blue by adding a little 0 5 per cent. solution of $NaNO_2$.

Urine, Detection of Albumin, Globulin, and Peptone in. R. Corso. (*Apoth. Zeit.*, **22**, 6.) A reagent is prepared with ammonium molybdate, 1; tartaric acid, 4; distilled water, 40. If the precipitate formed on the addition of a little of this reagent to the urine is dissolved by warming and reappears when the mixture cools, it is caused by peptone or globulin. If it be insoluble on the application of heat, albumin is present.

Urine, Detection of Indican in. P. Lavalle. (*Pharm Zeit.*, **52**, 127.) Two c.c. of pure HCl, containing 0·5 Gm. of Fe_2Cl_6 in 100 c.c. is added to 10 c.c. of urine ; 2 or 3 c.c. of pure H_2SO_4 is then added with careful cooling. The acid mixture is then shaken out with $CHCl_3$ which will be coloured blue by any indigotin formed.

Urine, Detection of Indoxyl in. (*Journ. Pharm. Chim.* [6], **24**, 347.) A. Grueber uses a 1 per cent. solution of osmic acid as the oxidizing agent for the production of indigotin from indoxyl ; 10 c.c. of the urine is treated with twice its volume of acid, and 2 drops of the osmic acid solution ; on shaking up a blue or violet colour is obtained in a few seconds if indoxyl is present.

Otto Mayer modifies Obermayer's test as follows :—Two c.c. of $CHCl_3$, 10 c.c. of urine, and 10 c.c. of a mixture of 30 drops of strong Fe_2Cl_6 solution in 100 c.c. of fuming HCl, sp. gr. 1·19, are well mixed by rotation in a small separator, avoiding emulsifying the $CHCl_3$. After separation the latter is removed and washed with water, when it will show a fine blue tint in the presence of indoxyl.

Nicholas employs furfural as a reagent ; this combines with indoxyl in presence of acids, giving a condensation product, the solutions of which in $CHCl_3$, C_6H_6, or CS_2, have a fine green fluorescence. A few drops of saturated aqueous solution of furfural, then an equal volume of HCl are added. If indican be present this is decomposed and indoxyl liberated, combining with the furfural, and the urine acquires a more or less intense yellow colour. On shaking out with one of the above solvents, the latter shows the characteristic fluorescence if indoxyl be present. (See also *Year-Book*, **1901**, 71.)

Urine, Detection of Sugar in. A. M. Kellas and F. J. Wethered. (*Lancet*, **1906, 2,** 1058, 1136.) After an exhaustive review of the various published methods for the detection and determination of sugar in urine, and the influence of the various normal and abnormal constituents on them, the following conclusions are arrived at :—

Fehling's test is retarded by the presence of creatine, creatinine and mucin, and by urates. In this respect creatinine is most active. This may be obviated either by diluting the urine so that its sp. gr. is lowered to 1·012 or 1·015, or by in-

creasing the volume of Fehling's solution used, or by precipitating the interfering substances. With Fehling's test the following proportions of solution should be used with each 2 c.c. of urine according to the sp. gr. :—Up to sp. gr. 1 020, 2 c.c. of Fehling's reagent; from 1 020 to 1·025, 2·5 c.c.; from 1·025 to 1 030, 3 c.c.; from 1 030 to 1 035, 3 5 c.c.; from 1 035 to 1 040, 4 c.c.; from 1·040 to 1 045, 5 c.c. For testing, the urine is either diluted until its sp. gr. ranges from 1·012 to 1 015 and treated with an equal volume of Fehling's solution, or more of the reagent is added in the proportion indicated above; the mixture is then boiled for a few seconds. If no precipitate occurs in 2 minutes it may be confidently concluded that no sugar of pathological import is present.

The alkaline safranin test of Crismer (*Year-Book*, **1889,** 100) deserves to come into more general use since it is, in the present state of knowledge, more definite than any other test as it is not interfered with by the other bodies present. It must be borne in mind, however, that safranin invariably gives a slight reaction with normal urine equivalent to 0 025 to 0 15 per cent. calculated as sugar. A 1 : 1,000 solution of safranin is to be used. Two c.c. of this, 2 c.c. of N/KOH solution, and 2 c.c. of the urine are mixed and boiled. If glucose is present to the extent of 0 1 per cent. the red colour is changed to yellow. An approximately quantitative test may be made by adding more safranin solution and again boiling, the addition and boiling being repeated until the red tint remains. Each 2 c.c. of safranin solution used =0·1 per cent. of glucose. Agitation should be avoided as the reduced leuco-body is readily reoxidized by the air. If much sugar is present the urine must be largely diluted. The average amount of reduction with normal urine by this test is equal to 0 07 to 0 08 per cent.

The phenylhydrazine test must be used with great caution when testing for small quantities of sugar. The fermentation test is untrustworthy, but last two tests are useful to distinguish glyconuric acid from glucose. All the other published tests tried are inferior in accuracy or convenience or both to the safranin test. The latter, in conjunction with the Fehling test, would suffice to settle doubtful cases where large quantities of creatinine cause Fehling's reaction to be uncertain.

Urine, Determination of Uric Acid in. F. St.-Laurens. (*Journ. Pharm Chim.* [6], **24,** 503.) Ten c.c. of standardized

Fehling's solution is exactly decolourized, but without employing excess, with solution of sodium bisulphite and made up to 100 c.c.; 1 c.c. of this solution will precipitate quantitatively 0·002334 Gm. of uric acid when the strength of the original Fehling's solution is such that 10 c.c. are reduced by exactly 0·05 Gm. of glucose. Twenty c.c. of urine is taken, treated with 5 c.c. of solution of Na_2CO_3 to remove phosphates. After agitation the decolourized Fehling's solution is run in drop by drop, the end of the reaction being determined by spotting out with the following indicator:—A small quantity of freshly prepared 1 per cent. solution of phenylcarbazide is treated with a few drops of water and a few particles of magnesium peroxide. Drops of this reagent are spotted out on a porcelain surface and mixed with powdered $NaCO_3$. A drop of the urine being titrated is applied to one of these drops of mixture. The end of the reaction is denoted by the formation of a violet colour.

Urine, Dimethylamido-benzaldehyde as a Reagent for Albumin, Indol and Skatol in. F. A. Steensma. (*Merck's Jahresberichte*, **20,** 102.) To detect *albumin* the urine is boiled with HCl 25 per cent., and treated with a 2 per cent. alcoholic solution of dimethylamido-benzaldehyde. In the presence of albumin a red colour is formed. On adding 0·5 per cent. solution of $NaNO_2$ a deep blue colour is formed, which is not removed by shaking up with $CHCl_3$. To detect *indol*, two parts of the urine are treated with 1 part of the reagent and 25 per cent. HCl is added drop by drop until a red colour is formed, which is converted into a deep red colour on the addition of a few drops of the $NaNO_2$ solution, if indol be present. Under similar conditions *skatol* gives at first a blue violet colour, changed to deep blue by the addition of $NaNO_2$. This blue colouring matter is soluble in $CHCl_3$, so that on shaking up with that solvent, it passes into the $CHCl_3$ layer on standing. The same reagent may be used to detect typhoid bacilli in cultures containing that microbe and *B. coli communis*, since the former alone causes the formation of indol. Cultures of pure *B. coli* give no reaction.

Urine, Distinctive Reaction between True Albumin and Mucinoid Bodies in. L. Grimbert and E. Dufau. (*Répertoire* [3], **19,** 1.) Urine frequently contains a mucinoid body, which gives more or less a faint cloudy precipitate with acetic

acid, and a hazy ring with nitric acid. This has doubtless been often mistaken for pathological albumin. This mucinoid substance is precipitated by all acids. The following method enables it to be distinguished from true albumin:—A strong solution of citric acid 100 in distilled water, 75, is prepared by the aid of heat. A few c.c. of this dense reagent is introduced into a test-tube, and a small quantity of the urine, previously filtered, is cautiously floated on the surface thereof, being gently delivered against the side of the tube from a very fine pointed pipette. Another tube, containing nitric acid, is similarly treated with a small portion of the urine. In the case of urine containing no albumin but only the mucinoid body, a nebulous zone, reaching its greatest intensity in about 10 minutes is formed over the citric acid solution, and sometimes pervades the whole supernatant aqueous layer. In the nitric acid test, there is no sharply defined precipitate at the immediate zone of contact, but a nebulous ring is formed some distance above; if but little of the mucinoid substance is present the cloudiness is very slight. In any case the appearance of the precipitate is quite distinct from that afforded by albumin. If only pathological albumin be present, no precipitate is formed over the citric acid solution, whereas with nitric acid a sharply defined ring is formed exactly at the zone of contact. Obviously when both albumin and the mucinoid body are present together, a precipitate is obtained both with the citric acid and the nitric acid tests. (See also *Year-Book*, **1902,** 150.)

Urine, Drugs which Interfere with the Pathological Reactions of. J. Bonnes. (*L'Union Pharm.*, **47,** 398, 497, 539; *Bulletin Comm.*, **34,** 521.) *Drugs which affect the normal colour of urine.—Analgene.* The urine is coloured blood-red after prolonged use or large doses of analgene. Addition of KOH or $NaHCO_3$ changes this to yellow, thus distinguishing the colour from that due to blood. *Pyramidon* causes a salmon-pink to cherry-red colour, due to rubazonic acid. This is soluble in $CHCl_3$, so that the colour is removed by shaking with that solvent. Blood pigments are not so removed. *Sulphonal* causes a dull red colour, due to hamatoporphyrin. This colouring matter is precipitated by a reagent of Ba2HO solution, 10 per cent., and $BaCl_2$ solution, 10 per cent., in equal parts, and the precipitate dissolves in alcohol containing HCl. *Phenol* gives a dull greenish colour to urine, ultimately becoming blackish.

On distilling 200 c.c. of the urine with 40 c.c. of HCl until 150 c.c. of distillate has been obtained, then adding Br solution, the characteristic tri-bromophenol precipitate will be obtained. This gives the odour of phenol when treated with sodium amalgam. *Naphthalin* imparts a dull brown colour due to β-naphthol-glyconuric acid. Bibulous paper moistened in the urine containing it turns red when it is treated with a few drops of dinitro-amido-benzol solution and warmed. *Salol* causes a dull green colour, sometimes blackish. The urine gives the reaction for salicylic acid with $FeCl_6$ reagent. *Phenocoll* produces a reddish-brown tint, becoming darker on exposure to air. With Fe_2Cl_6 solution the shade is darkened; it is rendered lighter on adding H_2SO_4, but does not disappear, and has a characteristic appearance by transmitted light. *Bromoform* in large doses may produce a greenish shade; but some urines containing sugar have a similar aspect. *Infusions of bearberry* and of *bilberry* give a green or bluish-green tint to urine, due to hydroquinone. This is shaken out by ether. *Thallin* produces a yellow to green colour, which is shaken out by ether; the ether residue gives a green reaction with $FeCl_6$. *β-Naphthol* produces an olive-green colour, or reddish after heavy doses. It changes to red-brown on boiling with HNO_3. *Santonin* produces a yellow colour due to xanthopsin; on adding an alkali, this turns red and retains its colour on boiling. On adding Ca2(OH) or Ba2(OH) to the urine a white precipitate is formed, leaving the liquid red. *Buckthorn and cascara sagrada* may give a yellow or reddish-yellow colour due to rhamnoxanthin. This gives a red colour with alkalies; on boiling, a red phosphatic precipitate is formed, soluble in acetic acid and turning yellow. *Rhubarb and senna* give a yellow or reddish-yellow shade due to chrysophanic acid. It is coloured red by alkalies, and is shaken out by ether.

Drugs which prevent the detection of indican.—Iodides. When patients have been treated with iodides, their urine may give a violet colour when treated with HCl and shaken out with $CHCl_3$, due to liberated I. On adding a crystal of $Na_2S_2O_3$ to this, any colour due to I is discharged, leaving the indigotin colour, if present, unaffected.

Drugs which prevent the determination of xantho-uric bodies.—Theobromine and *caffeine*, in the presence of ammonia and a magnesium salt, give when heated with silver salts insoluble precipitates. *Rhubarb* interferes with Denigès' method by reason of its colouring matter. *Iodides* also interfere.

Drugs which vitiate the albumin reaction.—The urine of patients who have been treated with *methylene blue* gives a precipitate with Esbach's reagent. *Copaiba balsam, sandalwood oil,* and *turpentine* cause a precipitate with HNO_3. It cannot be distinguished from that of albumin by treatment with alcohol, since both are insoluble in that solvent. With CrO_3 the urine of patients who have taken copaiba, cubebs, tar or turpentine gives a precipitate resembling that of albumin, but the precipitates are soluble in alcohol, whereas that of albumin is not. After *copaiba*, a rose colour is given when the urine is treated with an acid, and after sandalwood oil or turpentine a characteristic odour is evident. After *myrrh* a precipitate may be formed on boiling which might be mistaken for albumin. *Terpene hydrate* also causes a precipitate with the HNO_3 test. *Urotropine* causes urines to give an orange precipitate with Br solution similar to that formed by albumin ; but it is soluble on boiling.

Drugs which interfere with the detection and determination of glucose.—*Infusion of bearberry or bilberry* causes the presence of arbutin in the urine, which, being strongly laevogyre, prevents the determination of glucose by the optical method and being antiseptic, arrest the fermentation method. But these urines do not reduce Fehling's solution unless glucose is present. *Methylene blue* gives urines which have to be decolourized before the optical method can be applied. Animal charcoal is best for this purpose. A course of *quinine*, or the presence of various *albumins* and *peptones* affect the optical properties of urine, so does the administration of *benzosol*. After *salicylic acid, antifebrine, antipyrine, copaiba, benzoates, bromoform, camphor,* especially in large doses, urines are dextrogyre and reduce Fehling's solution more or less rapidly ; they do the latter also after *chloral hydrate, chloroform, cubebs, oil of turpentine, glycerine, Hydratis canadensis, morphine, quinine, rhubarb, salol, senna, sulphonal, tannin,* and *urethane.* After taking *senna, rhubarb* and *chloral hydrate* also, the urine reduces Mylanders' alkaline bismuth solution and will not ferment. After *phenacetin* the addition of Fe_2Cl_6 gives a wine-red colour, and after *tannin* the same reagent gives a blue-black colour. The reducing body formed by *urethane* is urethane glycuronate. The ethereal extract of a urine containing it when evaporated, taken up with water and made alkaline with KOH, gives a yellow precipitate with $HgCl_2$ solution, which becomes white on shaking and redissolves when warmed. Most of the above interfering sub-

stances may be eliminated by treating the urine with basic lead acetate, or with acid mercuric nitrate, before testing for sugar.

Drugs which vitiate the detection of acetyl-acetic acid.—The urine of patients treated with *antipyrine* or with *compounds of salicylic acid* give a red-violet to brown colour with $FeCl_6$. This may be distinguished from the acetylacetic acid reaction by boiling; the colour due to the latter is thereby discharged.

Drugs which prevent the detection of bile pigments. Antipyrine causes the urine to give a colour reaction with nitrous HNO_3 similar to that given by bile pigments. Hay's reaction, based on the precipitation of sulphur in urines containing biliary matter, is also given by urines after medication with *chloroform, turpentine,* and *phenol,* or its derivatives.

Drugs which modify Ehrlich's diazo-reaction.—*Cascara sagrada* causes the urine to give a rose tint with Ehrlich's diazo-reagent, resembling that given by typhoid urine. The administration of *salol, benzonaphthol, naphthyl salicylate, tannin, creosote, iodine* and *guaiacol* may prevent the formation of the diazo colour. The presence of *pyrocatechin* in the urine of cases of *phenol* poisoning, of *lactose* in that of pregnant women, and *glucose* in diabetes may cause a positive reaction.

Preservatives added to urine which may affect reactions. Formalin interferes with the determination of uric acid, the detection of indican, pentoses and of acetylacetic acid. *Chloroform* interferes as indicated above, and also in the detection of acetone. Alcohol and ether, said to be sometimes added, give Gmelin's reaction, and also react with Lieben's test, the formation of iodoform with iodine and KOH, as if acetone were present.

Urine, New Method for Determination of Sugar in. J. Bong. (*Berlin Klin. Woch.* through *Apoth. Zeit.*, **22,** 162.) Two standard solutions are prepared thus:—*No. 1.*—K_2CO_3, 250 Gm.; KCNS, 200 Gm. and $KHCO_3$ are dissolved in 600 c.c. of warm water. When cold, a solution of $CuSO_4 5H_2O$, 12·5 Gm. in water 75 c.c. is added and the volume of the mixture adjusted to 1,000 c.c.

No. 2.—Hydroxylamine sulphate, 3·275 Gm. and KCNS, 100 Gm., are dissolved in water and the solution adjusted to 1,000 c.c. Both solutions are stable. One c.c. of No. 2 should discharge the colour of 1 c.c. of No. 1. Ten c.c. of the urine is boiled for 3 minutes with 50 c.c. of the copper solution, then quickly cooled under the tap, and titrated to the discharging

of the blue colour with solution No. 2. Each 10 c.c. of the copper solution used up is equivalent to 8·5 Mgm. of glucose. If the urine contains a large amount of sugar, a less quantity must be taken, and diluted to 10 c.c. with water. After boiling with the copper solution, a distinct blue shade should be evident.

Urine, Phenylhydrazine Test for the Presence of Glucose in. R. Gruenwald. (*Munich. Med. Woch.; Pharm. Zeit.*, **52**, 384.) Ten c.c. of the urine is treated with a solution of 1·2 Gm. of sodium acetate in 6 c.c. of warm water, 2 drops of acetic acid, and 0·60 Gm. of phenylhydrazine hydrochloride. The mixture is then evaporated to 5 or 6 c.c. on the water-bath, and cooled. On examining the residue under the microscope the well-formed yellow needles of phenylglucosazone are readily detected in the amorphous residue and brownish-yellow glucuronic acid; the crystals of the latter melt at 155°C, while those of phenylglucosazone have the m.p. 206–207°C.

Valerian Root, Presence of a New Alkaloid and Glucoside in. J. Chevalier. (*Comptes rend.*, **144**, 154.) The powerful therapeutic and physiological action of fresh valerian root has indicated the presence of other and more active constituents than the esters of borneol found in the essential oil. The fresh root has therefore been investigated and the presence of an alkaloid or glucoside, and a resin, all physiologically active, has been established. The base is present in small quantity, only 0·15 per mille. This alkaloid is volatile and unstable so that its solution is difficult. The entire fresh root is first plunged in boiling alcohol 80 per cent. for 10 to 15 minutes to kill the very active oxidase present. It is then crushed and extracted with the same alcohol, in the presence of $CaCO_3$. The solvent is distilled off at a low temperature *in vacuo* to a syrupy mass. This is treated with alcohol 98 per cent., which leaves a considerable amount of resinoid matter insoluble. The alcohol is again distilled off *in vacuo* in presence of $CaCO_3$; a brownish syrupy residue, with a sharp piperaceous odour is obtained. This is rendered alkaline and extracted with ether or benzol; the ether solution is distilled, leaving a residue of the base, which is soluble in water, and a little essential oil which is insoluble. The aqueous solution is neutralized with dilute HCl, and evaporated *in vacuo*, when a crystalline hydrochloride is obtained. It has not been further investigated chemically, since its powerful

physiological action has been studied and the amount available was small. When given by injection to a dog in doses of 1 to 2 Gm. per kilo., the animal falls almost instantly as an inert mass; then opisthotonos supervenes without marked contraction of the limbs. Consciousness is not lost, but respiration and the heart beat are stopped for some seconds, then after gasping respiration, the heart movement recommences, but is slow and strong; paraplegia takes the place of paralysis; vomiting and salivation supervene; finally the animal recovers after remaining a certain time dull, somnolent and depressed. Ingestion and hypodermic injection produce none of these results, the animal being merely quieted and somnolent. The base has a marked analgesic effect locally; a 5 per cent. solution applied to the tongue resembles a 1 per cent. solution of cocaine in effect. The results of other physiological experiments show that the sedative action observed with preparations of fresh valerian are due to the presence of this alkaloid.

Veronal, Reactions of. P. Lemaire. (*Répertoire.* [3], **19,** 104.) Veronal (*Year-Book,* **1904,** 251) in aqueous solution gives no precipitate with formaldehyde solution, nor is it attacked in the cold by sodium hypobromite, but when heated with that reagent in presence of alkali, it is decomposed. It evolves NH_3 when heated with KOH. An alkaline solution of veronal gives a white precipitate with $HgCl_2$, readily soluble in acetic acid. With $HgNO_3$ it gives a greyish-black precipitate; its aqueous solution blackens HgCl; it gives an abundant precipitate with Millon's reagent; a white precipitate soluble in excess with $Hg2NO_3$, and also with $HgSO_4$ and $Hg2C_2H_3O_2$. If veronal is fused with KOH and S, and the resulting mass is dissolved in water, filtered, treated with HCl and boiled to drive off H_2S, and the residue is tested with Fe_2Cl_6, the blood-red reaction of sulphocyanides will be obtained. In solution in H_2SO_4 veronal gives the following reactions. With *Flueckigers' reagent* (water, 10 c.c.; H_2SO_4, 20 c.c.; $K_2Cr_2O_7$, 2 Gm.), on warming, a green to blue colour. With *Mandelin's reagent* (ammonium vanadate, 1; H_2SO_4, 200), while warm, greenish, then blue; yellow, then red-brown on boiling. With *Grandval* and *Lejoux's reagent* (phenol, 3 Gm.; H_2SO_4, 20 c.c.), on boiling, a brown colour. With *Wenzel's reagent* ($KMnO_4$, 1; H_2SO_4, 200), colour discharged on warming. With *Froehde's reagent* (sodium molybdate, 1; H_2SO_4, 100), on boiling, greenish-yellow, becoming

brownish. With H_2SO_2 yellow, then reddish-brown. With a mixture of formalin, 2 c.c., and H_2SO_4, 100 c.c., yellow when heated, then red-brown.

Vesipyrine, Phenyl acetosalicylate, Characters and Tests for. F. Zernik. (*Apoth. Zeit.*, 22, 152.) Vesipyrine,

$$C_6H_4 \langle \begin{matrix} O\ CO{\cdot}CH_3 \\ COO\ C_6H_5 \end{matrix}$$

is a white, almost tasteless, powder with a faint acetous odour. M.p. 97°C. Insoluble in water, soluble in alcohol and in ether. If 0·5 Gm. is boiled for 3 minutes with 10 c.c. of N/NaOH solution, filtered, and acidified with 10 c.c. of N/HCl solution, needles of salicylic acid separate out as the liquid cools. The solution of 0 2 Gm. of vesipyrine in 5 c.c. of alcohol 90 per cent. should not be coloured by the addition of a few drops of $FeCl_6$ reagent. The solution obtained by boiling 0 5 Gm. of vesipyrine in 10 c.c. of water and filtering when cold should be neutral and should leave no appreciable residue on evaporation.

Viburnum lantana, V. opulus, and V. tinus, Presence of Saccharose and Glucosides in. E. Bourquelot and E. Danjou. (*Comptes rend.*, *Biol.* through *Bull. Soc. Chim.*, **35**, 703.) The three above-named members of the genus *Viburnum* contain, in their leaves, saccharose, a reducing sugar, and a glucoside hydrolized by emulsin. The dried leaves of *Viburnum lantana* contain 3 6 per cent. of reducing sugar, 4·74 per cent. of saccharose and 0·32 per cent. of glucoside. *Viburnum opulus* gives 4 185 of reducing sugar, 4·74 per cent. of saccharose, and 0 612 of glucoside. *Viburnum timus* yields 3 78 per cent. ot reducing sugar, 3 48 of saccharose, and 0 418 of glucoside. The last-named contains as well a diastase which is analogous to emulsin.

Vicia angustifolia, New Cyanogenetic Glucoside in. G. Bertrand and — Riokind. (*Comptes rend.*, **143**, 832.) The seeds of *Vicia angustifolia*, under the influence of emulsin, or by the action of a specific zymase which they contain, yield 0·75 per mille of HCN. This is derived from the hydrolysis of a glucoside vicianin, which has been isolated in the form of brilliant colourless needles, crystallizing in tufts; solubility in water at 15–20°C., 0·12 to 0·13 : 100; readily soluble in hot water, much less soluble in alcohol, insoluble in $CHCl_3$, petroleum

ether and many other solvents. M.p. about 160°C.; $\alpha_D -20 \cdot 7°$. Although the seeds of many leguminous plants have been found to contain a ferment which hydrolizes vicianin, that glucoside has only been found, so far, in the genus *Vicia;* one member of this tribe, *Vicia narbonensis*, contained neither vicianin nor ferment in its seeds.

Water, New Gravimetric Method for the Determination of Ammonia in. A. Buisson. (*Journ. Pharm. Chim.*, **25**, 326.) The method is based on the fact that ammonia is entirely precipitated by $HgCl_2$ and Na_2CO_3 in the form of a definite compound having the formula, $2HgCl_2 \cdot CO_3(Hg_2N)_2(Hg_2N)_2O + 3H_2O$. It loses these 3 mols. H_2O, when dried at 100°C., so that the anhydrous compound may then be weighed. The weight of the compound, × 0 03, gives the equivalent of NH_3. The equation representing the reaction may be expressed as

$$10HgCl_2 + 8Na_2CO_3 = 2(HgCl_2 4HgO) + 16NaCl + 8CO_2$$

and

$$\begin{aligned} 2(HgCl_2 4HgO) + 4NH_4Cl + 2Na_2CO_3 \\ = CO_3(Hg_5N_2Cl_2)_2O + 4NaCl + CO_2 + 8H_2O. \end{aligned}$$

The determination is conducted thus:—A litre of water previously rendered alkaline with 5 c.c. of 25 per cent. pure NaOH solution is slowly distilled into 10 c.c. of pure 1 per cent. HCl solution, so that just over 100 c.c. of distillate is collected in an hour. This is made up to 1,000 c.c. (with ammonia free water). Then 10 c.c. of a 5 per cent. solution of $HgCl_2$ and 10 c.c. of 15 per cent. solution of pure Na_2CO_3 are added, and the mixture after agitation is set aside for 24 hours. The precipitate is then collected on a small filter pump thus constructed:—Two constructions are made close together in the beak of a small funnel. Glass wool is packed in the space between these so as to close the lower orifice; a layer of powdered glass is then carefully packed over this pad; the whole is washed with water into a vacuum receiver, then drained, dried and weighed. On this weighed filter the mercury-ammonium compound is collected, the filtration being regulated to obtain a steady, rapid flow in separate drops. The precipitate is then washed with 5 c.c. of water employed in two separate portions, drained, dried at 100°C., and weighed. The weight × 0·03, gives the amount of NH_3 in 1 litre of the water taken. If the amount of NH_3 present be less than 1 Mgrm.

per litre, as shown by the direct application of Nessler's test, then the distillate obtained should not be diluted; the distillate should pass into 1 c.c. only of 1 per cent. HCl solution, and the precipitate should be used in quantities of 1 c.c. each instead of 10 c.c. It is claimed that the method gives results with quantities of ammonia above 1 Mgm. per litre, which are at least as accurate as any known method; it also permits of a gravimetric determination of amounts below that quantity, when more than a litre of the original water is available.

Wax, Annamese. J. Bellier. (*Annales Chim. Analyt.*, **11**, 367.) The wax occurs in rectangular brick-shaped cakes, the corners of which are rounded. The colour is greyish-yellow and the cakes are not homogeneous, containing yellow translucid portions and irregular cavities. The wax appears to have been kneaded and shaped in the hands. When melted and strained it has the appearance of beeswax; sp. gr. 0·964; m.p. 61°C. It gives the following analytical figures:—Loss at 100°C., 5·02 per cent.; free acid value, 7·8; ester value, 86·6; saponification value, 94·4; ratio of ester to acid value, 11; iodine value, 6 per cent.; hydrogen evolved at 250°C. with KOH and potash lime, 60; 3 c.c. per Gm. at 0°C. under 760 Mm; unsaponifiable hydrocarbons, 10·5 per cent. The acid value is markedly lower, and the ester value higher than that of European bees-wax. It resembles the wax of Indian bees, described by Hooper. (*Year Book*, **1905**, 45.)

Wood Oils, Philippine. A. M. Clover. (*Philippine Journ. Sci.*, **1**, 191; *Schimmels' Report, April*, **1907**, 38.) *Oleoresin of Sindora wallichii*, "Supa oil."—A pale yellow mobile liquid with a faint fluorescence and a characteristic odour. Sp. gr. $\frac{30°}{30°}$, 0·9202; $a_{D30°}$ $-31·3°$; it separates white flaky crystals when cooled to 20°C.; these are a hydrocarbon, m.p. 63–64°C., and form about 5 per cent. of the oil. The oleoresin dissolves in most solvents except alcohol; it readily oxidizes and resinifies. It yields to steam distillation a colourless oil; $a_{D30°}$ $-21°$. The chief fraction boils between 143–149°C. under 40 Mm. This fraction distils between 255–267° under 750 Mm. The oil is probably a mixture of sesquiterpenes, from which cadinene has been isolated. It contains no alcohols.

Oleoresin of Dipterocarpus grandifluus.—"Apitong oil" or "Balao" is white and viscous when fresh; it contains from

25 to 40 per cent. of volatile oil and much water which separates with difficulty. The volatile oil cannot be obtained by steam distillation, for the oleoresin solidifies during distillation; it can only be separated by distilling over a naked flame when about 50 per cent. passes over, half of which is water. The oil thus obtained is yellow, with a characteristic odour; b.p. 200 to 300°C; the greater portion distils at 260–270°C. Sp. gr. $\frac{30°}{30°}$, 0·9127; $\alpha_{D30°}$ + 78·5. It is probably a sesquiterpene. Balao is largely used for caulking and as a varnish.

Oleoresin of Dipterocarpus vernicifluus.—"Panao oil" or "Molapaho." This dries more slowly than "balao." It is white and viscous when fresh and has a characteristic odour. It becomes more liquid on heating, thus differing from "balao," and is partially soluble in alcohol; water is present to the extent of about 25 per cent. It yields about 35 per cent. of oil, b.p. 256–261°C.; sp. gr. $\frac{30°}{30°}$, 0·9165; $\alpha_{D30°}$ −54. Its chief constituent is a sesquiterpene.

Wood Pulp in Paper, Detection of. A. Bergé. (*Bull. Soc. Chim. de Belge, Répertoire* [3], **18,** 456.) A reagent is prepared from para-nitroaniline, 20 Gm., dissolved in 80 c.c. of water and 20 Gm. of H_2SO_4, sp. gr., 1·767. Paper containing wood pulp, when spotted with this reagent, gives an orange colour changing to brick-red. The reaction is very evident, rendering individual particles of wood easily visible, so that they may be counted under the microscope. The colour is easily seen by yellow artificial light, which is not the case with the yellow reaction with aniline sulphate as usually employed. The new reagent is stable, and does not react with unbleached cellulose. (See also *Year-Book,* **1903,** 177.)

Wormwood, Essential Oil of, Detection of, in Liqueurs. L. Cuniasse. (*Journ. Pharm. Chim.*, **25,** 180.) The presence of oil of wormwood in the proportion of 3:1,000 may be detected in alcoholic solutions by means of the following reactions, which are due to the occurrence of the ketone, thujone, in the oil. (1) Combination with hydroxylamine and formation of acetoxime with Crismer's salt. (2) Formation of the phenylhydrazine compound. (3) Action of mercuric acid sulphate, which gives a precipitate with wormwood oil under the following conditions:—The solution of the alcoholic strength, 70 per cent., is increased 3 or 4 per cent., a corresponding volume of mercuric

acid sulphate is added, and the mixture is warmed on the water-bath. Tansy and fennel oils occasion a precipitate as well; but anise and hyssop give no reaction. (4) Wormwood oil in this dilution gives a green colour with iodine. (5) The following reaction will detect 1 : 1,000 of wormwood or tansy oil. Ten c.c. of the liquid of the alcoholic strength of 50 per cent. is treated first with 1 c.c. of freshly prepared 10 per cent. solution of sodium nitroprusside, then with a few drops of caustic soda solution, and finally with 1 c.c. of acetic acid. An intense red colour is produced in presence of the above-named oils; anise, coriander, fennel and hyssop give no reaction, nor does acetic aldehyde in the proportion of 1 · 1,000.

Xanthoxylum fraxineum and X. carolinianum Barks, Crystalline Bodies from. H. M. Gordin. (*Journ. Amer. Chem. Soc.*, **28**, 1649.) The northern prickly ash, *Xanthoxylum fraxineum*, and the southern prickly ash, *X. carolinianum*, have both been found to contain crystalline principles to which the name xanthoxylin has been given, although they are different bodies, and the same name has been given to yet a third substance derived from *X. piperitum*. To distinguish these, the name xanthoxylin-N is now given to the product of *X. fraxineum* and xanthoxylin-S. to that of *X. carolinianum*. Xanthoxylin-N., $C_{15}H_{14}O_4$, in dazzling white acicular needles, m.p. 132 5°C., optically inactive, is obtained from the benzene extract of the bark; this is treated with an equal volume of 5 5 per cent. alcoholic KOH, then treated with water and allowed to separate. The aqueous extract contains most of the xanthoxylin-N, while a waxy body is left in the benzene solution. The former is separated by saturating the solution with CO_2, when crystals are gradually formed. These are purified by recrystallization. It contains one methoxyl group, and is a mono-basic acid with phenolphthalein indicator, but neutral towards methyl orange. Xanthoxylin-S., probably $C_{14}H_{12}O_4$, in snow-white crystals, m.p. 119–120°C., is obtained by treating the oily residue of the benzene extract of the bark with twice its volume of petroleum ether. On standing a crystalline precipitate separates, which is collected, redissolved in ether, the ether distilled off and the residue recrystallized repeatedly from hot alcohol. It contains no methoxyl group and may be an alcohol or phenol of which xanthoxylin-N. is the methyl ester.

Zinc, Delicate Method of Precipitating. G. Bertrand and —. Javillier. (*Comptes rend.*, **143**, 900.) The zinc is precipitated quantitatively as calcium zincate, Ca2(ZnO·OH) $+4H_2O$. To the solution to be tested lime-water is added in excess followed by 10 or 15 per cent. of strong solution of AmOH. The mixture is boiled as long as ammoniacal vapour is given off; the precipitate consisting of calcium zincate and carbonate is collected. The zinc is then easily determined after precipitating the calcium as oxalate. It is claimed that zinc may be quantitatively precipitated in this manner from a dilution of 1 : 5,000,000.

Zinc, Detection of Minute Traces of, in Alcohol. G. Guerin. (*Journ. Pharm. Chim.* [6], **25**, 97.) A trace of zinc often occurs in commercial alcohols which have been stored even for a short time in galvanized iron drums or tanks. This is readily detected by the following reaction:—Two or 3 c.c. of a chloroformic solution of urobilin is added to 25 or 50 c.c. of the alcohol, followed by half its volume of water; on adding 2 or 3 drops of ammonia a characteristic green fluorescence will occur in the presence of zinc, the liquid assuming a rose tint by transmitted light; 0·05 Mgm. of zinc is sufficient to give the reaction. The $CHCl_3$ of urobilin is obtained by treating with HCl the urine of a patient suffering from cirrhosis or a febrile affection, and shaking out with $CHCl_3$. The $CHCl_3$ is washed after separation with distilled water acidified with HCl and kept in well-corked bottles.

MATERIA MEDICA

PART II

MATERIA MEDICA

Active Principles of Plants, Amorphous and Crystalline, Relative Therapeutic Activity of. (*Bull. Gen. de Therap.*, **152,** 281.) An interesting and important discussion on the relative value of crystalline and natural amorphous principles of various drugs took place at the meeting of the *Société de Thérapeutique de Paris* in February, 1907. Arising out of the claims of *Cloetta* to have isolated an amorphous soluble digitalin, " digalene," the method of preparing which has not been disclosed, *Chevalier*, while admitting that the isolation and administration of "pure" crystalline chemical bodies has had important bearing on therapeutics, pointed out that the erroneous opinion has been held by the younger practitioners that these crystalline principles represent the whole of the active constituents of the plants from which they are obtained. These so-called pure bodies, it should be borne in mind, are in reality almost all products of more or less violent chemical decomposition, and even these may vary greatly according to the chemical method employed in their extraction. Consequently, as shown by *Chevalier* and *Pouchet*, the pharmacodynamic activity of fresh plants is always markedly superior to that of the same plants dried or to the products extracted therefrom. In fact, in the course of the extraction of a so-called active principle, the physiological and toxic activity has been observed to diminish as the process for its isolation has proceeded. It has been repeatedly found that amorphous bodies are more active than the same substances in a crystalline state. The change of molecular condition would appear to explain this loss of activity. In fresh plants, the active principles seem to be contained in the juices in a colloid state, in the form of soluble, very complex, and easily decomposed compounds, readily decomposed by oxidation during the process

of drying, and split up by reagents or even by neutral so-called solvents. Even mineral salts present are in the same colloid state, and these are the first to be altered, by the action of air or heat, passing on to the crystalline condition. It follows that plant juices in the form of galenical preparations such as tinctures, and extracts have already been completely changed and have lost a portion of their physiological activity. In Chevalier's opinion the further removed an active principle is from its primitive colloid condition the greater is its loss of therapeutic power, and that by the time it is isolated in a crystalline state it only retains a fraction of its original activity. *Bardet* agreed that the modern tendency is to limit the study of pharmacology to that of the alkaloids, and that real progress in that branch of science cannot be made until more is known of the precise nature of the compounds of alkaloids, glucosides, and active principles as they exist in the plant. One of the fallacies which has acquired increased support during the past 20 years is the belief in the existence of absolutely definite principles in plants. *Germain Sée* furthered this by proposing to abandon the use of all galenical preparations in favour of the so-called active principles. *Bardet* considers it to be a "gratuitous superstition" to assume that bodies are pure, merely because they are crystalline. He has shown that crystalline substances are almost invariably accompanied in the plant by uncrystallizable bodies of the same molecular formula, and that these latter are at least as active physiologically as the former. This is the case, for instance, with uncrystallizable atropine, digitalin, and aconitine. In the case of atropine, it is more active in the amorphous than in the crystalline state. The only true basis of standardization of drugs is that of their physiological activity (as opposed to the present method of chemical standardization). In support of this the opinion of *Adrian* was quoted, that all potent preparations, even galenical products, should be physiologically standardized. *Patein*, on the other hand, strongly expressed preference for the medicinal use of crystalline principles rather than of amorphous bodies on the grounds of more definite chemical constitution. In this he was supported by *Richaud* and *Chassevant*, the latter pointing out that physiological experiments have no greater exactitude than chemical since the physiological reaction is not comparative between animals of different species or even between individuals of the same species. *Perrot* expressed the view that a middle course should be followed by pharmacologists,

avoiding on the one hand the assumption that the crystalline state alone is the standard of activity, and on the other hand not sanctioning the too wide use of non-crystalline preparations on the ground of the possible existence of a greater activity. The consensus of opinions expressed is that pharmacologists should be cautious in adopting the view that drugs should be standardized on the amount of crystalline active principles which can be extracted from them by chemical processes.

Alcohol as an Injection for Cystitis. J. Sellei. (*Merck's Jahresberichte*, **20,** 29.) Washing out the bladder with 5, 10, or 15 per cent. dilutions of alcohol has proved a useful curative treatment for cystitis, especially in those cases accompanied by prostatic hypertrophy. The washing is performed every, or every other day. The ammoniacal odour of the urine is speedily removed. Alcohol appears to have a direct and marked curative effect apart from its antiseptic action.

Alformin (*Merck's Jahresberichte*, **20,** 9) is a colourless liquid with a sweetish astringent taste and an acid reaction; sp. gr. 1·108. It contains 16 per cent. of $Al_2(OH)_2(HCOO)_4$. It is employed as an astringent and disinfectant as a substitute for aluminium acetate solution.

Ammonium Embelate Pills as an Anthelmintic. (*Merck's Jahresberichte*, **20,** 34.) Coronedi confirms Warden's statement as to the value of ammonium embelate as an anthemintic. He prescribes it in pills, thus:—Ammonium embelate, 8 grains, compound acacia powder, gum syrup of each q.s. to mass. Divide into 10 pills; 3 such pills to be given daily to children. Adults may take 7. Durand also prescribes ammonium embelate in capsules containing 6 grains. The patient is kept on a milk diet for 3 days, on the second of which the capsule is given in the morning, fasting. Coronedi states that in addition to its anthelmintic action it is a powerful antiseptic for the intestines and urinary organs. After taking embelates the urine is coloured cherry-red.

A. Weisner. (*Deutsch. Amer. Apoth. Zeit.* through *Pharm. Centralh.*, **48,** 78.) Prescribes ammonium embelate, 8 grains, massed with acacia licorice and syrup, and divided into 10 pills is an efficient anthelmintic. The dose for children is 5 pills in a day; for adults, 10 pills. The patient should be kept on

a milk diet for 3 days, and a dose of castor oil should conclude the treatment.

Amyl Nitrite for Hæmoptysis. A. Abrams. (*Lancet*, **1906, 2,** 1685.) The inhalation of amyl nitrite is stated to be the surest and most efficacious treatment for arresting pulmonary hæmorrhage. In some cases it fails to arrest the bleeding, yet for uniformity of action it is superior to other remedies. Unless the first administration is successful further doses are useless. Sufficient should be given to induce the physiological action.

Animal Charcoal, Japanese. — Takahashi. (*Pharm. Centralh.*, **47,** 707.) In Japan, an animal charcoal prepared by partially charring in a closed vessel the flesh of a poisonous snake known as "Hanbi," is widely used in medicine. Since calcination is not carried too far, hanbi charcoal is quite different from European animal charcoal, from which practically all the organic matter has been burnt off. It contains abundance of nitrogenous matter; when treated with alcohol, the solvent leaves a brown residue with an unpleasant odour, the solution of which has a deep blue fluorescence; dilute acids remove from it bodies having alkaloidal characters and it affords butyric and benzoic acids when treated with fused KOH. It is not, therefore, simple carbon and phosphates, but a complex drug from which therapeutic effects may be expected.

Anisotheobromine. — Sztankay. (*Pharm. Post*, **1907,** 154; *Journ. Pharm. Chim.* [6], **25,** 494.) This is claimed to be a molecular combination of sodium theobromine and sodium anisate, $C_7H_7N_4O_2{\cdot}Na-C_6H_4-OCH_3{\cdot}COONa$. It is introduced as a substitute for diuretine, than which it is less soluble and more stable. It is prepared by treating 45 Gm. of theobromine with 10 Gm. of NaOH in the presence of alcohol and water. Meanwhile 21 Gm. of sodium carbonate is dissolved in a solution of 38 Gm. of anisic acid. The solutions are mixed and evaporated to dryness.

Antipyrines, Physiological Action of. R. Kobert. (*Zeits. Klin. Med.* through *Pharm. Zeit.*, **52,** 200.) 3-Antipyrine, in which the CO group is in the 3 position, whereas in ordinary antipyrine it is at the 5 position in the ring, is more toxic than the ordinary form. Iso-antipyrine is similar in toxicity to ordinary antipyrine. 4-Amido antipyrine is less toxic than these; pyra-

midon is 6 or 8 times more powerful than the latter ; but 3-pyromidon, contrary to 3-antipyrine, is much less active than ordinary pyramidon; it is inert in doses which would be fatal with the usual kind. Similarly iso-pyramidon is distinctly less toxic than the original base. 1-ortho-acetylamidoantipyrine, which combines the physiological active groups of antipyrine and of acetanilide, is found to be free from toxicity to the human subject in doses of 7½ to 15 grains.

Apiolin. (*Merck's Jahresberichte*, 20, 37) is an extraction product of the seeds of *Petroselinum sativum*. It is a yellow fluid, sp. gr. 1 125 to 1·135 ; b.p. 280–300°C. It has been used in the treatment of dysmenorrhœa and post-partum uterine colic. It is prescribed thus for the latter by Theodorescu :— Apiolin, 3 grains ; menthol, 5 grains ; powdered white sugar, 30 grains. Mix and divide into 6 powders to be given in capsules, to be taken in 2 hours, the first 3 capsules every 10 minutes, the last 3 every half-hour. Sardou finds it a useful anti-spasmodic in intestinal colic, and other visceral pains, and in appendicitis ; for this purpose it is given in doses of 2 to 3 drops at half-hour intervals until 60 or 80 drops have been taken.

Armadiphtherin. (*Pharm. Zeit.*, 52, 170.) A glycerin extract of *Dichondra brevifolia* N.O. *Convolvulaceae*, a native of New Zealand, has been introduced as a remedy for diphtheria, in conjunction with the serum treatment. It is stated to be a powerful germicide, exercising a specific action on Loeffler's bacillus. It is a brown syrupy liquid with an odour of burnt sugar, and at first has a sweet taste with a sharp, bitter after-taste. It is applied locally to the affected mucous membrane.

Aspirophene and Formurol not Chemical Compounds. F. Zernik. (*Apoth. Zeit.*, 21, 1084–1085.) *Aspirophene* has been put forward as a molecular combination of aspirin and amidophenacetine, the formula

$$C_6H_4\left\langle\begin{matrix}OCOCH_3\\COOH{\cdot}NH_2{\cdot}CH_2{\cdot}CO{\cdot}NH{\cdot}C_6H_4{\cdot}OC_2H_5\end{matrix}\right.$$

being attributed to it. It is found, however, to be merely a mixture in molecular proportions of free salicylic acid and mono-acetylphenocoll.

Formurol, introduced as a chemical combination of citric acid with sodium hexamethylene-tetramine is also found to be

merely a mixture of 37·5 parts of hexamethylene-tetramine and 62·5 parts of neutral and acid sodium citrate.

Benzene for Harvest Bug. J. C. Thresh. (*Lancet*, **1906, 2,** 177.) The local application of benzene, followed by warm baths, or the use of dilute vinegar to allay the irritation, is found to be the most efficacious treatment for the eruption caused by the parasitic trombidian mite, *Trombidium holosericeum*, known as the "harvest bug."

Benzosalin. (*Merck's Jahresberichte*, **20,** 63.) Methyl-benzoyl salicylate is thus introduced into commerce. It is a white crystalline powder, m.p. 84–85°C. Insoluble in water. It is tasteless and is not decomposed by the gastric secretion. It is given in rheumatism and neuralgias in doses of 16 grains per diem.

Benzoyl-succinyl Peroxide. (*Schweiz. Woch.*, **44,** 68) is a crystalline colourless antiseptic with an aromatic odour and a pepper-like taste ; m.p. 96°C. It is soluble in chloroform and in alcohol. Water decomposes it into succinic and benzoic acids.

Bismuth Disalicylate and Ditannate. (*Pharm. Zeit.*, **52,** 179, 180.) By the double decomposition of bismuth salts at a low temperature with salts of tannic and salicylic acids, the basis of which form soluble salts with the acid in combination with the bismuth, bismuth ditannate, or disalicylate are precipitated, and may be collected, washed and dried. In the case of the salicylate, free salicylic acid is also formed, which is removed by treatment with suitable solvents, or by conversion into a soluble salt.

Bismuth disalicylate is a fine, white powder, at first tasteless, with a sweetish after-taste. Its aqueous suspension in cold water is neutral ; on boiling salicylic acid is split off and bismuth subsalicylate formed. It contains 48 to 52 per cent. of Bi_2O_3. It is employed as an astringent antiseptic in doses of 10 to 12 grains repeated up to 4 times daily.

Bismuth ditannate is a pale yellow powder with a faint acid bitter taste. The suspension in water is neutral in reaction. It contains about 20 per cent. of Bi_2O_3. It is given as an intestinal astringent in doses of 8 grains.

Blenal. (*Apoth. Zeit.*, **21,** 975.) This is stated to be the carbonic ester of santalol $(C_{15}H_{23}O)_2CO$. It is obtained by treating santalol with chloroxy-carbonic acid in the presence of alkali, or with carbonic esters. It is a yellowish, oily, tasteless, and almost odourless liquid. It is recommended as a substitute for sandalwood oil, on the grounds that it is slowly decomposed in the intestines, so that free santalol is not present in quantity, thus obviating the irritation caused by that alcohol. The dose is 15 drops 3 times daily. It may be given in capsules.

Borovertine, a New Urinary Disinfectant. O. Mankiewicz. (*Journ. Pharm. Chim.* [6], **25,** 292.) It is claimed that boric acid forms definite stable compounds with hexamethylene tetramine, one of which, the triborate, has been introduced under the name borovertine. It is presented either alone or in tablets with 5 per cent. of boric acid, or in doses 15 to 30 grains in 24 hours, which may be increased up to 60 grains in that time. If the appetite is adversely affected the treatment should be intermitted for a day or two. Borovertine is at least as useful a urinary disinfectant as urotropine, and it causes the excretion of slightly acid urine, which in some cases is a matter of great advantage.

Bromural. E. Saam. (*Pharm Centralh.*, **48,** 193.) This is a ureide of α-mono-bromo-iso-valerianic acid $(CH_3)_2CH\cdot CHBr\cdot CO\,NH\cdot CO\,NH_2$. It occurs in small, white, sparingly soluble crystals, more soluble on warming; dissolved by alcohol and by alkalies; m.p. 125°C., not sharp, as it sublimes. In doses of 5 to 10 grains it is stated to be an excellent hypnotic. Its action is manifest in 5 to 25 minutes, and lasts for 3 to 5 hours. It is specially indicated in the insomnia of nervous trouble and is without bad after-effects.

Cactus grandiflorus. L. E. Sayre. (*Proc. Amer. Pharm. Assoc.*, **1906,** 405.) The examination of the drug showed that it contained no alkaloid; that the tincture made from the sliced drug gave a very low yield of extractive; and physiological experiments by Dr. Houghton on himself proved it to be practically inert on the heart, although in very large doses it might have a diuretic action. It is not considered that *Cactus grandiflorus* should receive official recognition. (See also *Year-Books* **1892,** 155; **1895,** 137; **1898,** 142.)

Calcium Chloride for Ulcer of the Leg. D. Ross. (*Lancet*, **1907, 1,** 512.) Calcium chloride in doses of 15 grains three times a day is recommended in the treatment of ulcer of the leg. Two cases of extensive ulceration were quickly cured by this remedy.

Calcium Chloride in Therapeutics. (*Merck's Jahresberichte*, **20, 74.**) Both English and Continental authorities are quoted, showing the value of $CaCl_2$ internally as a haemostatic. Toubert advises its use before operation in surgical cases to lessen haemorrhage, 3 doses each of 15 grains being given. Todd White reports its value in epistaxis; W. E. Dixon finds that many reputed haemostatics are useless when taken internally, but that $CaCl_2$ and other calcium salts are decidedly active. G. A. Stevens prescribes $CaCl_2$ with good results in doses of 10 to 15 grains in cases of chilblains.

Calomel, Pharmacology of. — Valeri. *Noveaux Remèdes*, **23, 56.**) When calomel is administered by hypodermic injection, it is eliminated more actively in the urine than in the faeces. If a mixture of bile or pancreatic juice is digested with HgCl at 37°C., a soluble mercury compound is formed. The NaCl present in the pancreatic secretion takes no part in this reaction. When given in minute non-purgative doses, HgCl notably retards gastric absorption. Marfori considers that this action explains the antiseptic properties of calomel in the intestine, for HgCl itself is not an antiseptic.

Camphor, Algerian. J. A. Battandier. (*Journ. Pharm. Chim.*, **25,** 182.) Although camphor trees were introduced into Algeria years ago, they were not found to be productive of camphor. This is not due to the effect of climate, since trees since grown from seed obtained in 1892 from Formosa have been found to give from 1·05 to 1·4 per cent. of camphor by distilling the fresh leaves and twigs. This variability of yield in camphor is known to occur in those countries to which the trees are indigenous. It is suggested that good results might be obtained by a process of selection of seedlings, and also by grafting. At the present price, camphor growing in the Colonies would be remunerative.

"Cantharides," Mexican. C. Hartwich. (*Schweiz. Woch. Chem. Pharm.*, **45, 73.**) A specimen of so-called Mexican "cantharides" was found to consist chiefly of an aquatic insect

of the order *Rhynchota*, allied to the common "water boatman," *Notonecta glauca*. These insects were found to contain no cantharidin, but a trace of a crystalline body which gave rise to no vesication when applied to the skin. The specimen examined was very sandy, giving no less than 58·79 per cent. of ash. These so-called "cantharides" are therefore quite worthless for medicinal purposes.

Cascarilla Bark, Commercial. C. Hartwich. (*Pharm. Journ.* [4], **23**, 485; *Apoth. Zeit.*, **21**, 776.) No less than eight barks derived from various species of *Croton* have appeared in commerce since 1901 as cascarilla; they all agree with genuine cascarilla in containing no sclerenchymatous cells in the cortex. Hence more care must be taken in examining and accurately describing cascarilla, and special attention should be paid to the height and breadth of the medullary rays as seen in tangential section, and to the thickness of the primary sclerenchymatous fibres. The following brief description of the anatomical characters of these various barks may be useful:

1. Very like genuine cascarilla; taste very bitter; medullary rays, 1 to 2 cells wide, up to 20 cells high; calcium oxalate in rosettes, seldom in prisms. Primary fibres in little groups at the apex of the bast rays, the single fibres up to 26μ wide. Numerous cells with brown contents.

2. Very similar, but fibres thicker (up to 35μ); medullary rays often 4 cells wide, sometimes 5.

3. Cork light brown, longitudinally striated; section yellowish taste intensely bitter; fibres up to 34μ; secondary fibres fairly numerous, often in little groups. Medullary rays 1 cell wide, rarely 2.

4. Yellowish grey, very bitter, slightly aromatic. Primary fibres up to 13μ. Calcium oxalate only in rosettes; medullary rays 1 to 2 cells wide; brown cells numerous.

5. Very thin, greenish bark, with bitter, aromatic taste, recalling nutmeg. Primary fibres up to 26μ. Oxalate in rosettes and single crystals. Medullary rays 1 to 2 cells wide.

6. Cork whitish or (in young bark) brownish. Taste bitter and aromatic. Primary fibres up to 14μ; secondary fibres rather numerous. Medullary rays, 1 to 2 cells wide. Oxalate in rosettes only. Brown cells scattered.

7. Thin bark with whitish cork and green cortex. Taste very bitter, slightly aromatic. Primary fibres single or in couples,

up to 13μ ; secondary fibres scattered. Medullary rays, 1 to 2 cells wide.

8. Thicker bark with greyish cork ; resembles No. 7, but the primary fibres up to 22μ ; brown cells more abundant.

No. 1 differs from the bark of *Croton cascarilla*, Bennet (*Clutia cascarilla*, L.) only in the much more bitter taste which, however, may have become less marked during the long storage of museum specimens.

Chlorbutanol. (*Pharm. Centralh*, **48**, 340.) This product of the action of acetone on chloroform has been introduced as a hypnotic, sedative and anti-emetic. It is given in doses of 4 to 20 grains, in capsules, or alone.

Cholesterol Hypodermically for Tetanus. Almaglia and Mendes. (*Répertoire* [3], **19**, 274.) Having found that hypodermic injections of cholesterol possess marked anti-tetanic action on animals, the authors treated two cases of tetanus in the human subject by this means and both were cured. The dose given amounted to 24 grains in 24 hours ; amelioration of the condition of the patients was evident in 4 days and the cure was complete in 19 days. In one of these cases anti-tetanic serum had been used without effect.

Cinnamon Bark, Essential Oil of, for Influenza. J. Carne Ross. (*Lancet*, **1906**, **2**, 1240). D. J. Munro. (*ibid.*, 1624.) The authors confirm the value of cinnamon bark oil for the treatment of influenza. At the outset 12 drops of the oil are prescribed, and the dose is repeated in an hour ; 2 hours after the second dose 10 drops are given, which is repeated every 2 hours until the temperature falls to normal ; 10 drops are then taken 3 times daily for a day or two. The patient should, if possible, remain indoors for 2 or 3 days. Dr. Carne Ross has thus treated influenza for 16 years, and generally finds that the attack is cut short in a few days, and in no single case has it lasted for more than a week. Cinnamon leaf oil is of no value for the purpose.

Dr. Munro confirms the value of the oil for influenza, and suggests that on the score of economy the official tincture of cinnamon may be sometimes substituted for the oil.

Citrocoll (*Pharm. Zeit.*, **51**, 808) is stated to be the neutral citrate of amino-acetylparaphentidine ($C_6H_4\,OC_2H_5\,NH\cdot$

$CO\ CH_2NH_2)_3C_6H_8O_7$. It occurs in crystals, m.p. 193°C., and is obtained by direct combination. It is claimed to be non-toxic and is given in doses of 60 to 90 grains per diem for adults, and 30 to 60 grains for children in neuralgias, migraine and similar affections. Citrocoll is soluble in water.

Cloves, Essential Oil of, as a Disinfectant. J. C. Webster. (*L'Union Pharm.*, **47**, 402.) Clove oil is stated to be more effective than sublimate for sterilizing the hands, while its advantages are obvious. The hands should be scrubbed for 5 minutes with hot water and soap, dried on a sterilized towel, then immersed for a minute in alcohol. They are then well rubbed for 4 or 5 minutes with clove oil, and again rinsed with alcohol. Bacteriological cultivations of the scrapings of the skin after this treatment and after the use of $HgCl_2$ solution, 1 : 1,000, showed clove oil to be markedly superior. Silk threads coated with pathogenic microbes were completely sterilized by immersion in clove oil for 35 minutes. Catgut ligatures were more efficiently sterilized by soaking for 8 days in clove oil, then for 6 or 8 hours in alcohol 95 per cent., than by any other method.

Codliver Oil as a Vermifuge by Rectal Injection. — Chéron. (*Nouveaux Remèdes*, *Supp.*, **23**, 12.) An emulsion, prepared with codliver oil, 40 Gm.; the yolk of 1 egg; water, 125 Gm. administered as a rectal injection has given better results in the treatment of patients infested with thread worms than any other vermifuge. In some cases where the desired effect has not been obtained with the emulsion, the injection of the undiluted oil has invariably succeeded.

Combretum sundaicum, the Reputed Anti-Opium Remedy. L. Wray. (*Pharm. Journ.* [4], **24**, 453, and D. Hooper, *ibid.*) Wray described the method of preparation and use of the drug.

Hooper has examined the leaves and finds that they contain a small amount, 0 15 per cent., of a crystalline alkaloid which gives a carmine-red colour with H_2SO_4 and $K_2Cr_2O_7$. A tannin and an acid resin are also present.

Coryfin. (*Apoth. Zeit.*, **22**, 169.) This name has been given to the ethyl glycollic acid ester of menthol, $C_{10}H_{19}OCHOCH_2OC_2H_5$.

O

It occurs as an oily, almost odourless, neutral solution, b.p. 155°C. under 20 mm. It is sparingly soluble in water. In the presence of alkalies menthol is liberated. It is employed as a local application for neuralgias, headache and similar painful affections. It may be used both externally or internally, either alone or in a mixture. The sensation of coldness produced by its application to the skin lasts for 10 minutes.

Corsican Moss. J. B. Garcain. (*Journ. Pharm. Chim.* [6], **24,** 119.) The active ingredient of true Corsican moss is the alga, *Alsidium helminthocorton.* Although Corsican moss has fallen into disrepute as an anthelmintic, due, according to the author, to the grossly impure nature of the product, which often contains but little of the true seaweed, it is certainly an active vermifuge, especially for round worms. *Alsidium helmenthocorton* contains besides gelatinous matter and fat, a brown, resinous constituent with a pronounced odour. The last-named appears to be the active principle, and may contain an alkaloid combined with an acid resin.

Cotton Seed, Extract of, as a Galactogogue. — Oudiette. (*Bull. gén. de Thérapeut.*, **153,** 388.) The extract of cotton seeds is an excellent galactogogue, increasing the flow of milk without any adverse action on the system and without affecting the chemical constitution of the secretion. It is without the least toxic action ; the author has taken 50 Gm. per diem without experiencing any inconvenience. The normal effective dose is 3 teaspoonfuls per diem.

Cystopurin (*Pharm. Centralh.*, **48,** 68) is a compound of 1 mol. of hexamethylene tetramine and 2 mols. of sodium acetate ; it occurs in long white needles, very soluble, 1 : 0 9, in water, the solution being nearly tasteless. It is given as a disinfectant of the urino-genital organs.

F. Zernik. (*Apoth. Zeit.*, **22,** 469.) Cystopurin has been introduced as a compound of 2 mols. of sodium acetate and 1 mol. hexamethylene-tetramine, the formula, $C_6H_{12}N_4 \cdot 2CH_3COONa + 6H_2O$, has been attributed to it, as stated above. A patent has been taken out for its preparation by mixing aqueous solutions of the components in the proportions indicated, and concentrating *in vacuo* at 45°C. ; the pure double salt is said to

crystallize out in long pointed crystals. Zernik finds that commercial cystopurin does not give results in accordance with this formula. It contains considerably more hexamethylene-tetramine and less sodium acetate than the formula requires. Nor could a double salt be obtained by the method indicated by the patent; the long needles obtained were nothing but pure sodium acetate, and in one instance thick crystals of hexamethylene-tetramine were formed.

Digitalis, Relative Medicinal Value of First and Second Year's Leaves of. E. H. Farr. (*Pharm. Journ.* [4], **24,** 198.) Physiological experiments conducted by Dr. G. S. Haynes with tinctures made by the author from the first year's leaves and those of the second year's flowering plant, show that the relative toxicity of the tincture from first year's leaves and the tincture from second year's leaves is as $8\frac{1}{4}$ is to 10; that is to say, the latter is rather more potent. Both the tinctures are more toxic than that originally adopted by Dixon and Haynes as a standard, demonstrating that a highly active preparation can be obtained from the first year's leaves.

The leaves were collected, dried, and powdered by the author, the petioles being included in the powder. In the *P. L.* 1851, the petioles were directed to be removed.

Dolomol. (*Apoth. Zeit.*, **22,** 388.) Magnesium stearate, $Mg2C_{18}H_{35}O_2$, with a little oleate and palmitate, has been introduced in America, as a dusting powder for skin diseases. It forms a white, light, almost odourless and tasteless unctuous powder, and is used either alone or combined with other drugs.

Dymal in Dental Practice. A. Reissner. (*Nouveaux Remèdes*, **23,** 121.) In addition to being a useful general disinfectant (*Year-Book,* **1901,** 144), dymal, didymium salicylate, is of special service in dental work as a substitute for iodoform. It has proved useful in the treatment of gangrenous pulp, in buccal ulceration, empyema and similar morbid conditions. Its freedom from odour renders it of great value for treatment of affections of the teeth and mouth.

Elemi, Manila, Botanical Source of. (*Chem. and Drugg.*, **69,** 678.) Bentley and Trimen ("Medicinal Plants," 1880) concluded that the oleoresin was obtained from a species of *Canarium* closely allied to *C. commune*, and most authors have

followed their lead, though some have given *C. album* and others, quite erroneously, *Icica abilo*, Blanco, as the source. D. Merrill, who has worked with botanical material collected in the Philippines by the staff of the Bureau, now supports Trimen and Bentley's statement to the extent that the source of elemi is *Canarium luzonicum*, Gray, a species peculiar to the Philippines and closely related to but not identical with *C. commune*. Other species of *Canarium* growing in the islands yield "brea," as elemi is locally named, but little or no "elemi" from any other source than *C. luzonicum* is ever exported.

Escalin. (*Apoth. Zeit.*, **22,** 386.) Metallic aluminium in a minute state of division, 2, in glycerin, 10, put up in the form of pastilles each containing 45 grains of metallic aluminium, has been introduced as a harmless substitute for bismuth subnitrate, under the name of escalin. It is prescribed in gastric ulcer and similar affections of the stomach, in doses of 4 tablets stirred up in half a tumblerful of water to be taken fasting. No food should be taken for a couple of hours after taking this dose.

Estoral. (*Journ. Pharm. Chim.* [6], **24,** 25.) Menthyl borate has been named estoral. It occurs as a white crystalline powder with a slight odour of menthol. When dry it is quite stable, but is decomposed on contact with moisture. It is recommended as a remedy for acute or chronic nasal catarrh, for which purpose it should be mixed with an equal weight of milk sugar, to avoid the sensation of burning if the tissues are inflamed.

Ethyl Formate as a Diuretic. A. Amblard. (*Annales de Pharm.*, **12,** 402.) Ethyl formate in doses of 50 drops per diem acts as a powerful diuretic, and has succeeded where theobromine has failed. It is readily soluble in water, and is well tolerated, doses of 100 to 150 drops having been given without producing any ill effects.

Rochon (*Journ. Pract.*, **1906,** 378; *Merck's Jahresberichte*, **1906,** 7) recommends ethyl formate for choleraic enteritis of children and for diarrhoea of adults.

Eucolo, Guaiacol Acetate. G. Biscaro. (*Apoth. Zeit.*, **22,** 154.) Guaiacyl acetate has been introduced into medicine

under the above name. It is a colourless liquid, sp. gr. 1·138, with a faint guaiacol odour; soluble in alcohol and in ether, and 1 : 5 in almond oil. It is easily saponified and quickly absorbed in the system. Its administration is stated to cause no disturbance of the kidneys. It may be administered both by the mouth and by hypodermic injection, the latter in solution in almond oil, the dose of which is 1 c.c.

Eugatol, a Harmless Hair Dye. H. Kreis. (*Schweiz. Woch.*, **44,** 830.) This is stated to be a solution of sodium ortho- and para-aminodiphenylamine sulphonates, which is stated to be free from the irritant properties of para-phenylenediamine. (See *Year-Books*, **1905,** 124; **1906,** 58.) When made alkaline and shaken out with ether scarcely anything is removed by that solvent; the contrary is the case with paraphenylene diamine. A 1 per cent. solution of eugatol acidified with HCl gives a red colour passing to violet, blue, and green with Br solution, Fe_2Cl_6 and chlorinated soda solution. Paraphenylenediamine also gives a reddish-violet colour, but this is discharged by excess of Br solution, and excess of hypochlorite gives a white precipitate. A 1 per cent. solution made faintly acid with HCl and treated with a little aqueous solution of phenol and Fe_2Cl_6 gives a deep blue colour. Paraphenylenediamine gives a faint brownish red.

Eutanin. — Thoms. (*Journ. Pharm. Chim.* [6], **24,** 65.) This preparation has been put forward as an astringent remedy. It is stated to be merely a mixture of chebulic acid derived from myrobalans, and milk sugar.

Euscopol. (*Pharm. Zeit.*, **52,** 158.) This name is given to chemically pure optically inactive scopolamine hydrobromide. It differs from the official Ph.G.iv. and the commercial salt in being free from allied mydriatic bases, and is not a mixture of optically active and inactive salts. It sinters at 165–170°C., melts at 180–181°C., and forms a clear liquid at 185°C. The picrate formed by precipitating euscopol solution with picric acid melts at 192–194°C.; that of optically active scopolamine melts at 190–191°C.

Forgenine. L. Vanzetti. (*Nouveaux Remèdes*, **23,** 63; *Boll. Chim. Farm.*, **1906,** 593.) This name has been given to tetramethylammonium formate—

$$H{\cdot}CO{\cdot}O{\cdot}N \begin{matrix} CH_3 \\ CH_3 \\ CH_3 \\ CH_3 \end{matrix}$$

It occurs in very hygroscopic crystals, the aqueous solution of which is neutral and stable when heated. It is obtained by the double decomposition, in molecular proportions, of silver formate and tetramethylammonium iodide. The precipitated AgI is filtered out and the filtrate, evaporated to a syrup, is crystallized *in vacuo* over CaO and H_2SO_4. When injected hypodermically forgenine is a powerful poison in doses of 1 Cgm. for 1,000 Gm. of body weight, causing tetanic convulsions like curare. In small doses it acts as a useful cardiac stimulant.

Formic Acid in Medicine. (*Merck's Jahresberichte*, **1906**, 5.) Although C. Fleig has not been able to confirm Clément's statement as to the action of formic acid on the muscles (*Year-Book*, **1904**, 213), he finds that it is a useful stimulant of the appetite and a diuretic. Stern recommends the use of formic acid both internally and also locally as an application in the form of a 2 to 5 per cent. solution in glycerin, for diphtheria, and for inoperative cancer ; it is also useful internally for secondary and tertiary syphilis, and for tuberculosis. He also prescribes it for intestinal troubles due to toxins. The sodium salt has been prescribed with success in doses of 5 to 20 drops of the 25 per cent. solution for diphtheria by Croom, and other authors confirm the good effects obtained as a diuretic antiseptic and general tonic.

Grindelia, Botanical Characters of some Californian Species of. P. E. F. Perrédès. (*Proc. Amer. Pharm. Assoc.*, **1906**, 370.) The botanical source of the *Grindelia* examined by Power and Tutin (*Year-Book*, **1906,** 39) has been traced to *G. camporum*. *G. squarrosa* is of doubtful occurrence in California. *G. robusta* is a comparatively rare plant, in fact it is not sufficiently common to be of any importance as a source of the drug. *G. camporum* occurs in abundance and is largely collected. Other species of *Grindelia* are described, but *G. camporum* is alone considered to be the source of the drug. The prevalent statement that it is derived from *G. robusta* and *G. squarrosa* is erroneous. Plates are given of the various species of *Grindelia* described.

Heroine and Dionine, Toxicity of. — Sollier. (*Répertoire* [3], **18**, 363.) Heroine, contrary to the statements sometimes made, does not possess any advantage over morphine as to relative toxicity and it has all the ill effects of morphine. Consequently it cannot be used as a cure for the morphine habit. The same applies to dionine; "dionomania" and "heroinomania" are as dangerous as morphinomania.

Histosan. (*Merck's Jahresberichte*, **20**, 142.) Histosan is a product of the action of guaiacol on egg albumin or casein; it is considered to be guaiacol albuminate. It is a light brown insoluble powder, but dissolves in alkaline solutions. It is given as a tonic and stimulant of the appetite in anaemia and similar diseases, and has also been employed with success in chronic bronchitis. The dose is 8 grains 3 or 4 times daily. For children a 5 per cent. histosan syrup may be prescribed, a teaspoonful of which is to be taken 3 or 4 times a day.

Hordenine Sulphate. L. Camus (*Archiv. Internat. Pharm. Therap.; Therap. Monats.*, **21**, 96.) Hordenine sulphate (*Year-Book*, **1906**, 41) should prove useful in medicine since it exercises a stimulating action on the heart, vessels, and the secretions. It is only very slightly toxic, the lethal dose for warm-blooded animals per 1 kilo body weight being 1 to 2 Gm. by hypodermic injection, and 0.3 Gm. injected intravenously.

Hypnotic Cachet for Neurasthenic Insomnia. (*Bull. gén. de Thérapeut.*, **152**, 800.) Trional, 15 grains, phenacetine, 2½ grains for one cachet. To be taken at bedtime.

Ichthynate. (*Pharm. Zeit.*, **52**, 312.) Ichthynate is a new icthyol substitute obtained by the destructive distillation of bituminous schist in the Karwendel mountains. The product of distillation is sulphonated and converted into an ammonium salt. The commercial article is a 50 per cent. solution of this. Ichthynate is perfectly soluble in water, giving clear solutions with a faint acid reaction. It precipitates tarry matter when treated with excess of mineral acids. In action it resembles ichthyol in all particulars.

Iodin. (*Pharm. Centralh.*, **48**, 126.) This is a compound of iodine with the fatty acids of arachis oil, stated to be propyl-di-io-odolic acid monoiodo-arachinic acid ester. It is obtained

by the action of iodine vapour on the purified fatty acids of the oil. It forms a dark-coloured oily liquid with a fatty odour and peculiar taste, and is introduced as a means of administering iodine.

Iodine internally as a Remedy for Anthrax. A. F. Llobet. (*Comptes rend.*, **143**, 1264.) Since 1891, 70 cases of anthrax have been treated in the human subject by the internal administration of iodine, and not one fatal result has followed. Experiments with rabbits showed that those which had previously received a preventative dose of iodine in aqueous solution were able to withstand an injection of anthrax culture, such as proved fatal to the control animals in 60 to 80 hours. The treatment, however, in the case of rabbits, ceases to be efficacious if it is commenced more than 10 or 12 hours after inoculation ; it must be continued for 48 to 60 hours after the death of the control animal. The dose of iodine given to the rabbit was 3 to 5 Mgm. night and morning, administered in very dilute solution by means of an oesophagal sound.

Iodofan (*Journ. Pharm. Chim.* [6], **25**, 250), is produced by the action of formaldehyde on rescorcin monoiodide and is claimed to be mono-iodo-dioxy-benzol-formaldehyde, $C_6H_8I(OH)_2HCHO_2 + 2H_2O$. It is a reddish-orange odourless and tasteless powder, insoluble in water and decomposed by warm alkaline liquids, and partially so by boiling. It is employed, generally, as a substitute for iodoform.

Zernik (*Apoth. Zeit.*, **22**, 96) finds, however, that commercial iodofan does not correspond with this formula, since it yields only, as a mean, 4·08 per cent. of iodine, instead of 42·04 per cent. as required by the above formula. It also contains 15·46 per cent. of H_2O instead of 11·93 per cent.

Jatrevin. (*Merck's Jahresberichte*, **20**, 157.) Jatrevin, a condensation product of menthol and isobutyl phenol, is a clear aromatic liquid, miscible in all proportions in alcohol. It is introduced as a harmless bactericide and has been employed in the treatment of tuberculosis, in which and in catarrh it has given good results in the form of an inhalation.

Kola Nuts, Pharmacology of. — Chevrotier and Vigne. (*Journ. Pharm. Chim.* [6], **25**, 263.) The superiority

of fresh over-dried kola nuts is insisted on. The essential active principle of the drug is a caffeine-tanno glucoside contained in the fresh nut. On drying, this is decomposed with the formation of kola red and the liberation of caffeine. The latter is the sole physiologically active ingredient of the dried nuts. By destroying the oxydase present by Bourquelot's method the authors have obtained a white or slightly violet-tinted powder of the drug, which contains the unaltered glucoside. This powder keeps perfectly when mixed with sugar. It is not affected by heat nor by exposure to the atmosphere, and may be compressed into firm tablets.

Lenicet. (*Merck's Jahresberichte*, **20**, 172.) This basic aluminium acetate preparation has been employed with success as a 10 per cent. ointment in the treatment of blennorrhoea neonatorum, blepharitis, and burns. The same ointment has also been used as a basis for scopolamine and atropine ointment. It is used as well for dry eczema and other forms of skin complaints. As a dusting powder for wounds lenicet should not be applied pure, but mixed with French chalk; if used alone it forms a hard crust on the wound which is difficult to remove.

Lysan, a New Antiseptic and Disinfectant. (*Apoth. Zeit.*, **22**, 259.) This is stated to be the product of the action of formaldehyde on certain terpenes and allied bodies such as cineol, menthol and eugenol, dissolved in alcohol. It is miscible in all proportions with water, alcohol and glycerin; is stable and does not act on surgical instruments, and is relatively non-toxic. It is employed as a ½ to 1 per cent. solution for disinfecting wounds; in 3 per cent. solution for room disinfection; a 1 per cent. solution is best for instruments.

Mango, Gum Resin of. D. Hooper. (*Pharm. Journ.* [4], **24**, 718.) Doubtful statements as to the nature of mango "gum" being current in literature, freshly gathered samples of the product were examined. The gums were resinous in character, like bird-lime, soft and sticky, and varying from a pinkish-white mass to amber-coloured tears. There was a slight terebinthinate odour and bitterish taste. Small portions dissolved largely in spirit leaving a white pulverulent gum, but they were only partially soluble in water.

An analysis of the clean gum-resin showed the following com-

position :—Moisture, 4·34 ; resin, 79·16 ; gum, 14·68 ; ash, 1·66 ; loss, 0·16 per cent.

A sample of gum-resin from another tree afforded 78·4 per cent. of resin.

The resin was soluble in alcohol, ether, chloroform, bisulphide of carbon, and glacial acetic acid. Its acid value was 66·55.

Manna from Schrebera swietenoides. D. Hooper. (*Pharm. Journ.* [4], **23,** 258.) The tree yielding this exudation is allied to the ash tree yielding commercial European manna. Schrebera manna is soluble in 5 times its weight of water, and yields to boiling alcohol a crystalline constituent having the properties of mannite.

Mannite as a Laxative. I. Maranne. (*Bull. Comm.*, **34,** 475.) Mannite is found to be the active laxative principle of manna and is recommended as the most pleasant to take and satisfactory in action of all aperients. For children it is specially serviceable. The medium dose for an adult female is 5 to 10 drachms, dissolved in water, which may be drunk as ordinary sweetened water.

Melioform. (*Merck's Jahresberichte,* **20,** 184.) A new antiseptic containing 25 per cent. of formaldehyde and 15 per cent. of aluminium acetate has been introduced under this name. It is useful for disinfecting the hands and instruments in the form of a 0·5 to 1 per cent. solution. A gargle of 0·3 to 1 per mille. solution is also used for tonsilitis and pharyngitis ; and a 0·1 to 0·3 per mille. dilution is used to wash out the bladder in cystitis.

Mergal. (*Therap. Monats.*, **20,** 552.) This name has been given to the cholic acid mercury salt, $Hg2C_{24}H_{39}O_5$, a yellowish white powder insoluble in water but soluble in alkalies and in physiological salt solution, It is introduced as a remedy for syphilis and is put up in capsules containing 0·05 Gm. of mergal, with twice its weight of tannin albumin. The dose for the first 5 days is 1 such capsule 3 times a day ; on the sixth day this is increased to 6 capsules and in severe cases as many as 8 or even 10 may be given per diem. The capsule must be taken after meals and the patient should be carefully dieted, all raw fruit and vegetables to be avoided, also acid substances, fat, and alcohol, except red wine at meal times.

Microscopical Observation of the Structural Development of certain Official Plants. D. Stscherbatscheff. (*Archiv. der Pharm.*, **245,** 49.) A description, with illustrations, is given of the structure of the seed and root of *Atropa belladonna*, of *Glycyrrhiza glabra*, and of *Althea officinalis* at various stages of development.

Monotal. — Impens. (*Therap. Monats.*, **21,** 84.) This name is given to guaiacyl ethyliglycollate, $C_2H_5OCH_3COOC_6H_4OCH_3$, a colourless aromatic syrupy liquid, sp. gr. 1·130 to 1 131 at 20°F.; b.p. 170°C. under 25 Mm. Less soluble in water than guaiacol. It is introduced as a substitute for that body, to be administered by inunction or *per os* in the treatment of phthisis and for other affections for which guaiacol is prescribed.

Myrrh for Diphtheria. — Stroll. (*Nouveaux Remèdes*, **22,** 385.) Excellent results have attended the administration of a 1 : 20 tincture of myrrh in water in doses of about 90 to 260 minims in 24 hours, according to the age of the patient. This quantity is given in fractional doses every hour during the day, and every two hours at night; in severe cases it may be given every half-hour. It is said to stimulate, and thus increase the phagocytosis and resistant capacity of the patient.

Nastin. — Deycke and — Reschad. (*Deutsch. Med. Woch.* through *Pharm. Zeit.*, **52,** 77.) It is claimed that the purified solid fatty matter which has been named nastin, extracted from the leprosy streptothrix by fractional extraction with ether, and purification with alcohol, when injected in the form of oily solution, not only renders healthy men and animals immune to the action of the leprosy bacillus, but also, in the case of those already affected, cuts short the course of the disease, and prevents a recurrence of the symptoms. On normal subjects it produces no reaction. It is administered in 1 per cent. solution in sterilized olive oil, which is cloudy at ordinary temperatures, and must therefore be gently warmed until clear before being used. The dose is 0·5 c.c. for each injection, or 5 Mgm. of nastin: this quantity is ultimately increased to 1 c.c. or 10 Mgm.

Neurofebrine. F. Zernik. (*Berichte Pharm.* through *Pharm. Zeit.*, **52,** 202.) This is a mixture of equal parts of neuronal (bromo-diethyl acetamide) and acetanilide. It has been introduced as an analgesic and sedative.

Neuronal. W. Heinicke. (*Therap. Monats.*, **21**, 97.) Bromo-diethyl acetamide, a white crystalline powder, m.p. 66–67; solubility in water, 1 : 115, is introduced as an effective hypnotic in *dementia precox* and other mental diseases. A medium dose, in the form of powder or tablet is 8 to 16 grains, but as much as 32 grains may be given.

Novocaine for Ocular Anaesthesia. — Hoppe. (*Nouveaux Remèdes*, **23**, 170.) On account of its perfect neutrality, and the fact that its solution may be sterilized by heat, without decomposition, novocaine (*Year-Book*, **1906**, 104) is considered to be superior to cocaine for ophthalmic use. Its solutions are free from any irritant action and do not affect the ocular functions, although they produce a durable anaesthesia.

Oil Grasses of Ceylon and India. O. Stapf. (*Kew Bullet.* **1906** [8], 297; *Schimmels' Report*, April, **1907**, 30. The whole class of Indian and Cingalese oil grasses is reviewed and new nomenclature adopted to lessen the prevailing confusion. The grasses are divided into 10 species of the genus *Cymbopogon*, and one each of the genus *Vetiveria* and *Andropogon*.

(1) *Cymbopogon schoenanthus*, Spreng. (*Andropogon schoenanthus*, L. *A. laniger*, Desf. *A. Iwarancusa*, subspec., *laniger*, Hook., f.) Camel grass. A characteristic desert plant distributed over North Africa and Arabia and in Persia, Afghanistan, and Beluchistan.

(2) *Cymbopogon iwarancusa*, Schult; said to be the *Nardus indica* of the ancients; a native of mountainous districts of India, where it is known, and "Terankus," and is reputed to be a febrifuge.

(3) *Cymbopogon nardus*, Rendle. (*Andropogon nardus*, L.) Citronella grass. It is only found in cultivation, and is grown chiefly in S. Ceylon, the Malacca Peninsula, and Java. The origin is probably the wild manna grass, *Cymbopogon confertiflorus*, which grows wild in Ceylon. Citronella grass occurs in two varieties, "Maha pangiri," known also as "old" citronella grass, and "Winter's" grass is chiefly grown in Java and the Malaccas; and "Lana batue" or "new" citronella which forms the bulk of the Ceylon grass. It yields an oil of less value than the Maha pangiri form.

(4) *Cymbopogon confertiflorus*, Stapf. (*Andropogon confertiflorus*, Steud. *A. nilagiricus*, Hochst. *A. nardus*, var. *nila-*

giricus, Hack) is found in India between the Meghiris and Ceylon and in Ceylon itself. It is, as before stated, probably the original plant from which citronella grass is derived. It has the same odour but yields only a small quantity of oil. The Cingalese name is "Mana"; in India it is known as "Bambe."

(5) *Cymbopogon flexuosus*, Stapf. (*Andropogon flexuosus*, Steud. *A. nardus*, var. *flexuosus*, Hack.) Malabar or Cochin grass. It occurs in the wild state only in the Tinnivelli district and in Travancore. It yields the lemon-grass oil obtained from the Malabar coast. It has often been confused with citronella grass, and is so illustrated in Bentley and Trimen's *Medicinal Plants*, but differs in possessing large loose grey panicles with thin curved diagonals which frequently hang down. The spathes are less distinct and the aristae are smaller, very thin and sharp. The sheaths of the radicle leaves are narrower and not red inside.

(6) *Cymbopogon coloratus*, Stapf. (*Andropogon coloratus*, Nees. *A. nardus*, var. *coloratus*, Hook., f.) is found in Tinnivelly and Madras; and belongs to the lemon grasses of the Malabar coast. Its oil is not known.

(7) *Cymbopogon citratus*, Stapf. (*Andropogon citratus*, D. C. *A. schoenanthus*, L. *A. citriodorum*, Desf. *A. roxburghii*, Nees. *A. ceriferus*, Hack. *A. nardus*, var. *ceriferus*, Hack. *Schoenanthum aboinicum*, Rumph.) Lemon-grass, in Malay known as "Sereh." This species is cultivated, and is found in most tropical countries; it is grown on the largest scale near Singapore. Its oil differs from Malabar lemon-grass oil in being less soluble and generally containing less citral, so that it is less valuable.

(8) *Cymbopogon martini*, Stapf. (*C. martinianus*, Schult. *Andropogon martinii*, Roxb. *A. pach nodes*, Trin. *A. calamus aromaticus*, Royle. *A. nardoides a*, Nees. *A. schoenanthus*, Flueck and Han. not, *A. schoenanthus* var. *genuinus*, Hack. *A. schoenanthus* var. *martini*, Hook., f.) Rusa grass, geranium grass. Occurs on the banks of the Ganges to the Afghan frontier and in the subtropical zone of the Himalayas. Although the grass is widely distributed, the oil is distilled only in certain districts. Two varieties of the grass are known, "sofia" and "motia," but it is uncertain if these are true varieties or different stages of development of the same species. According to *Pharmacographia Indica* "motia" grass is the young form and yields the palma-rosa oil of commerce. "Sofia" is the more mature grass and yields "ginger-grass" oil. Fernandez states,

however, that "motia" grass is the more mature form, and "sofia" the younger grass.

(9) *Cymbopogon caesius*, Stapf. (*Andropogon caesius*, *α* and *β*, Nees. *A. schnoenanthus*, var., *caesius*, Hack.) Kamakshi grass is closely allied to *C. martini*. It yields from 0·431 to 0·711 per cent. of oil.

(10) *Cymbopogon polyneuros*, Stapf. (*Andropogon polyneuros*, Steud. *A. versicolor*, Nees. *A. schnoenanthus*, var. *versicolor*, Hack. *A. nardoides β minor*, Nees ex Steud.) Occurs in the Nilghiris and in Ceylon, and has the odour of fennel or anise. It yields oil the properties of which are not known.

(11) *Vetiveria zizanioides*, Stapf. (*Andropogon muricatus*, Retz. *A. squarrosus*, Hack. *Vetiveria muricata*, Griseb.) Vetiver grass or cuscus occurs both wild and cultivated all over British India where its aromatic roots are much esteemed. It occurs cultivated or of accidental introduction in many tropical countries.

(12) *Andropogon odoratus* was discovered by Dymock in Thana. It yields an oil. (See also p. 64 *ante*.)

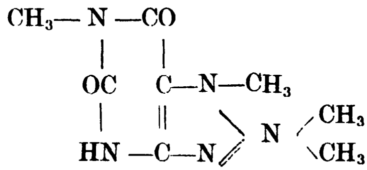
Olive Leaves, Tincture of, as a Tonic and Febrifuge. Sir James Sawyer. (*Pharm. Journ.* [4], **23**, 376.) D. Hanbury has previously directed attention to the valuable febrifugal action of olive leaves, quoting Maltass of Smyrna, who had employed the decoction of the leaves with success in treating fevers, for which he considered it superior to quinine. The author finds that a tincture of 4 oz. of the dried leaves in 1 pint of alcohol 60 per cent. is an efficient tonic in doses of 15 to 30 minims; and is a febrifuge and antiperiodic in larger doses. An extract of the fresh leaves may be given as a tonic in 5 grain doses.

Opium, Turkey, Commercial Grades of. C. M. Kline. (*Amer. Journ. Pharm.*, 79, 156.) *Smyrna Opium.*—The varieties of Smyrna opium are as follows:—"Boghaditz" opium is named from the district in which it is produced, between Smyrna and Constantinople. It is the richest in morphine of all the Asia Minor opiums, but is very gummy. "*Yerli*" opium is that from districts surrounding Smyrna, "Yerli" meaning "surrounding." It is rich in morphine, soft, and poor in appearance. "Karahissar" opium is derived from the country beyond the "Yerli" opium district, further from Smyrna, and

practically covers all the interior of Asia Minor with the town of Karahissar as its centre. It is of good appearance generally; the poorer grades are known as "Adet." The best grades are used to mix with Yerli opium. The morphine content ranges from 11·5 to 12 per cent.

Salonica opium includes all that produced in European Turkey. It was formerly of very good quality, yielding 14 per cent. of morphine, and not much was produced. Now, much more is put on the market, but the quality has fallen to 10 per cent. of morphine. Tokat and Malatia opium are produced in Armenia. It is known as "shipping opium for smoking purposes." The term, "Talle Qualle," often applied to opium, means "as it runs," indicating that the parcel is sold as opium, the purchaser may only reject what is not natural opium. "Visitsel" opium, on the other hand, indicates that a definite test has been applied, and that any portion of the parcel which does not meet this may be rejected.

Paraxine, a New Diuretic. J. Forschbach and S. Weber. (*Archiv. exp. Path. Pharm.*, **56**, 187; *Apoth. Zeit.*, **22**, 109.) Dimethyl-amino-paraxthine,



has been introduced as a diuretic, paraxanthine being an isomer of theobromine and theophylline. Paraxine occurs in long, fine, white needles, m.p. 126°C with sublimation. Sparingly soluble in cold water, rendered more soluble by alkalies and acids. It is given in doses of 7½ grains, 15 to 60 grains being administered in 24 hours. The diuresis produced is considerable. Its use is often accompanied by gastric discomfort or nausea; in some cases nervous troubles and vertigo are observed. The urine of patients treated with paraxine gives a white crystalline precipitate with acids, due to separation of dimethylamino heteroxanthine, m.p. 319°C.

Peruvian Balsam for Scabies. F. J. W. Porter. (*Brit. Med. Journ.*, **1907** [2413], 744.) The patient is first well scrubbed in a very hot bath for half an hour with soap and water, special atten-

tion being directed to the most infested parts. After quick drying, the following varnish is applied thoroughly over the whole body by means of a soft worn nail-brush :—Glycerin, 1 oz. ; Peruvian balsam, 3 oz. This quantity will suffice for a man of ordinary size. A cotton shirt is then put on with clean or hospital clothing, the patient's ordinary clothes and bedding being thoroughly disinfected. In very bad cases a second rubbing with the varnish is given the following morning to the worst parts. Bathing is forbidden for 7 days to ensure destruction of all ova ; probably 3 or 4 days' abstention would be enough. This method has been found most effectual in military service, and would be equally valuable in the out-patient department of civil hospitals and on transports, etc.

Phenyform. A. Stephan. (*Therap. Monats.*, **20,** 544.) Phenyform $(C_6H_4 \cdot OH \cdot CH_2OH)xCH_2O$, a compound of phenol with formaldehyde, has been introduced as a disinfectant and deodorant. It occurs as a greyish-white, light, odourless and tasteless powder, insoluble in water and most other solvents, but dissolved by alkalies and ammonia. It is practically nontoxic. In general antiseptic properties it is equal to iodoform and its deodorant powers are considerable.

Physiological Action of New Bases of Beef Muscle. (*Archiv. Phys.* through *Bull. gén. de Thérap.*, 1907, **153,** 153.) Of the newly discovered bases from beef muscle, ignotine, novaine, oblitine and neosine, the last three have a powerful action on certain organs. Oblitine is the most powerful, exciting the salivary glands, and the peristaltic action of the intestine, also affecting the arterial pressure and the reaction of the pupils.

Picrasma javanica, Bitter Bark of. D. Hooper. (*Pharm. Journ.* [4], **23,** 258.) The intensely bitter bark of this tree known in Burma as napawsaw, is used as a febrifuge instead of quinine. It contains no alkaloid, but a bitter principle, similar to, if not identical with quassin. It contains no tannin. It might replace quassia as a bitter tonic.

Pittylene, Pix methylenata. (*Pharm. Zeit.*, **52,** 213.) Pittylene is a condensation product obtained by treating liquid pitch with formaldehyde, in which the penetrating odour of tar is almost entirely eliminated. Pinewood tar is treated with

formaldehyde at a low temperature; the reaction product is dissolved in alkali, the solution filtered and the filtrate precipitated with acid. The precipitated pittylene thus obtained is washed and dried. The yield varies from 70 to 90 per cent. according to the kind of tar used. Pittylene is an aggregating yellowish-brown powder with scarcely any tarlike odour, which readily mixes with ointment bases. Mpt., 117–119°C. Soluble in strong alcohol ether, $CHCl_3$, acetone, terpineol and collodion. These brown solutions, which may be made of the strength 1 : 10, leave a flexible brown varnish when applied to the skin. This is readily soluble in soap or weak alkaline solutions. With alkalies it forms water-soluble compounds which are serviceable in those cases where alcohol and similar solvents are not applicable. It is used as a dressing in eczema and other skin diseases in the form of dusting powders, pastes, ointments, soaps, etc.

Pituitary Gland, Opotherapeutic Effects of. — Renon and Delille. (*Journ. Pharm. Chim.* [6], **25**, 264.) The ingestion of 1½ grains night and morning of the whole powdered hypophysis of the ox, has a general action in whatever cases it is given of slowing the pulse, elevating the arterial tension, increasing the appetite and diminishing insomnia. In cases of Basedow's disease, pulmonary tuberculosis, typhoid and the myocarditis of typhoid, similar results are obtained. It is argued that the primary infection with these diseases may be due to hypophysary insufficience, since many of the symptoms are favourably modified by treatment internally with the powdered gland. From comparative experiments it appears that the posterior lobe is the most active part of the pituitary body, which may be regarded as a true cardiac stimulant. If the anti-toxic action of the gland is confirmed, the administration thereof might serve as a protective against infection.

Polygonum dumentorum as a Purgative. — Tunmann. (*Pharm. Centralh.*, **47**, 842.) The entire dried plant of *Polygonum dumentorum* possesses marked purgative properties which have proved of great efficacy in the treatment of chronic constipation. It may usefully substitute senna or buckthorn bark; its action, although constant and prompt, is not violent; results have been obtained with it which indicate that it is to be preferred to many other purgatives. It is best administered in the form of a decoction of the entire herb, 1 : 10. Microchemical reactions

indicate that its physiological action is due to the presence of tannoglucosides or anthra-glucosides.

Punaria ascochingæ, a Remedy for Asthma. (*Merck's Report*, **20,** 202 ; *Pharm. Zeit.*, **52,** 435.) This plant is a composite occurring in Argentina. The dried powdered herb is used as a remedy for asthma, bronchitis and other chest affections, the powder being ignited and the smoke inhaled, in a similar manner to that customary with *Datura tatula*.

Quinine Acetosalicylate. L. Santi. (*Merck's Jahresberichte*, **20,** 84.) This salt, $CH_3\,CO\,O\,C_6H_4\,COOH{\cdot}C_{20}H_{24}N_2O_2$, is a white crystalline powder, sparingly soluble in water. It has been given with success in pleurisy and peritonitis.

Quinine Phytinate. S. Posternak. (*Bull. gén. de Thérapeut.*, **152,** 853.) This salt, anhydro-oxymethylene-diphosphate of quinine,

$$O\left\{\begin{array}{l} CH\left\langle\begin{array}{l}H\\ O{\cdot}PO(OH)_2\end{array}\right. \\ CH\left\langle\begin{array}{l}O\ PO(OH)_2\\ H\end{array}\right.\end{array}\right. \Big\rangle C_{20}H_{24}N_2O_2$$

is obtained by saturating anhydro-oxymethylene-disphosphoric acid with hydrated quinia until the solution ceases to give an acid reaction with Congo-red paper. The liquid is then filtered and dried *in vacuo*. It forms a crystalline, yellowish, bitter powder, very soluble in water, insoluble in organic solvents. Although it is so soluble it should never be administered hypodermically. It is prescribed in paludism, neuralgias, Menière's disease, and in all complaints for which the sulphate or hydrochloride of quinine are given, since the action of the phytinate is claimed to be more satisfactory than that of those salts.

Rexotan. (*L'Union Pharm.*, **47,** 491.) Rexotan is methylene-tannin urea, is a yellowish-grey, perfectly odourless and tasteless powder, insoluble in dilute acids, but readily soluble in alkalies. It is given as an intestinal astringent and antiseptic in chronic and acute catarrh, both for adults and children ; for the latter the dose is 1½ to 5 grains three times daily ; for adults, 10 grains

thrice a day is given. It does not act in intestinal tuberculosis, nor in nervous affections, nor in catarrh of the stomach.

Rhamnus fraugula Bark Adulterated with Alnus glutinosa. L. Wuerffel. (*Apoth. Zeit.*, **22,** 283.) A specimen of so-called buckthorn bark has been met with in which the greater part consisted of the bark of the common alder, *Alnus glutinosa.* Not only does this bark differ essentially in histological characters from buckthorn bark, but when a little of the powder is placed in a watchglass covered with a microscope slide and heated, a sublimate of yellow oily droplets are obtained, the colour of which is not altered when treated with caustic alkali solution. When pure powdered buckthorn bark is thus treated, a sublimate of well-formed crystalline needles of oxymethyl-anthraquinones is obtained; this is coloured deep red by alkali.

Ringworm. Formaldehyde Solution for. Desborough Brodie. (*Lancet,* **1906, 2,** 191.) An application by rubbing with formaldehyde solution, 40 per cent., is stated to be a reliable cure for ringworm. One very severe case was cured by one rubbing with formalin followed by the application of dilute yellow mercuric oxide ointment. The disease was dead in a fortnight and the hair began to grow in a month. Cases of tinea circinata disappear after one application. For tinea tonsurans more than one application may be necessary, but never more than three.

Saccharin for Ammoniacal Urine in Cystitis. F. Little. (*Journ. Med. Paris.; Nouveaux Remèdes,* **23,** 190.) It is found that the administration of saccharin has a powerful antiseptic effect on the urine and prevents ammoniacal fermentation in the alkaline urine of chronic cystitis and other bladder affections; although it has no specific action on the disease, it greatly adds to the comfort of the patient by suppressing this troublesome condition.

Sesame Oil, Two Cases of Toxic Action of. E. Rautenberg. (*Pharm. Centralh.,* **48,** 115; *Deutsch. Arch. Klin. Med.*) Two samples of French sesame oil have been met with, which gave rise to severe blood poisoning in patients to whom it was administered in the form of clysters, and which produced toxic symptoms when given to animals. German sesame oil, and

other specimens of French oil, were found to be quite free from any poisonous constituent.

Silver Compounds, Bactericidal Action of. C. R. Marshall and E. F. Macleod Neave. (*Brit. Med. Journ.*, **1906**, [2381], 359.) The 15 preparations named below were examined; the percentage of silver in them having first been found to be as follows: Collargol, 88·6; silver fluoride, 81·7; silver nitrate, 63·6; itrol, 60·8; actol, 51·5; argentol, 31·2; ichthargan, 27·1; argyrol, 20·0; albargin, 13·4; nargol, 9·6; largin, 9·4; novargan, 7·9; protargol, 7·4; argentamine, 6·4; argonin, 3·8.

Of these silver nitrate, silver fluoride, actol, itrol, argentamine, argentol, albargin, argonin, ichthargan, largin, novargan and protargol are found to be active bactericides. Nargol is less active, and argyrol and collargol have practically no bactericidal action whatever.

As argyrol and collargol are not bactericidal, it is evident that the amount of silver which a compound may contain is no criterion of its bactericidal power.

Soap Pills for Diabetes and Gall Stones. H. Senator. (*Med. Woch.; Apoth. Zeit.*, **22**, 284.) Powdered medicinal soap, massed with mucilage, coated with powdered cinnamon, and divided into 1½ or 2 grain pills, are prescribed for the treatment of the above diseases. Three pills are to be taken 3 times daily at meal times.

Sodium Bisulphite Solution for "Chrome Sore." H. S. Riederer. (*Journ. Soc. Chem. Ind.*, **26**, 511.) Workmen in chemical works where chromates or bichromates are used in quantity are generally affected with very painful and persistent sores. It is found that a 5 per cent. solution of sodium bisulphite used as a lotion or dressing to the sore twice a day is an excellent cure. In one case a sore which had existed for 8 or 9 months was completely healed in about 3 weeks by applying the bisulphite solution twice daily, without any special bandaging. The men in a chrome plant were furnished with the bisulphite solution to use as a supplementary wash after work, and a decided improvement in their condition was immediately perceptible. Sores in the initial stage, when thus treated, healed quickly and left no scar.

Sodium Citrate for Dyspepsia. — Lacheny. (*Bull. gén. de Thérapeut.*, **153**, 343.) In 14 cases of adult dyspepsia treated with sodium citrate in doses of 16 to 24 grains, marked improvement was obtained in a week with 9 patients. It has proved serviceable for hypersthenia, vomiting and painful gastric disturbances, calming gastric irritability. Soda is considered to be a powerful gastric sedative ; the benefit derived by treating dyspeptic subjects with $NaHCO_3$ is attributed, in great part, to this and not to the action of the CO_2 liberated.

Sodium Perborate as an Antiseptic Dressing. — Genevrier. (*Bull. gén. de Thérap.*, **153**, 155, after *Archives Med. Milit.*) Sodium perborate in fine powder is an ideal antiseptic dressing, being cheap, soluble, odourless, free from irritant action, and perfectly non-toxic. Its application arrests capillary haemorrhage, causes no pain, and promotes rapid healing. As it only evolves oxygen when moistened or in contact with moist surfaces, its action is maintained so long as there is secretion from the wound. It does not form hard crusts, and is easily removed by simple washing ; the solution thus formed being alkaline and charged with oxygen is itself a useful cleansing and disinfectant. For use, it may be conveniently kept in a wide-mouth bottle, tied over with fine gauze, through which the powder is dusted on to the surface of the wound. The perborate is also useful for the extemporaneous preparation of oxygenated water, its solution in the ordinary strength used in surgery being free from irritant action.

Sophol, Silver Formonucleinate. (*Bull. Comm.*, **34**, 477.) This organic silver compound is stated to contain 20 per cent. of Ag, which is so combined that it is not detectable by the usual reagents. In compounding it, the application of heat should be avoided ; its solutions should be freshly prepared in the cold ; contact with metals should be avoided, and if solutions must be stored, this should be done in amber glass bottles. Sophol is a yellowish-white powder very soluble in water. It is stated to be much less irritant than other silver preparations. It has been used successfully in 5 per cent. solution for treating the gonorrhœal ophthalmia of newborn infants.

Spigelia marilandica, Ruellia ciliosa, and Phlox ovata, Structure of the Stem of. T. Holm. (*Amer. Journ. Pharm.*, **79**, 51.) When flowers are present the mere colour of the corolla is sufficient

to distinguish *Spigelia* and its two substitutes. The corolla of *S. marlandica* is scarlet externally, yellow within; and the clavate tube is about 4 times longer than the lobes. *Ruellia* has light blue or purplish funnel-shaped flowers; in *Phlox ovata* the coralla is pink and salver-shaped. The leaves, which are figured, differ markedly in form, venation and structure. The stems of *Spigelia* are 4-winged and shows bicollateral mestome strands; those of *Ruellia* are quadrangular, the tissues containing cystoliths; in *Phlox* the stems are cylindrical and contain no crystals. A full histological description of the structure of the leaves of the 3 plants is given and illustrated. (See also *Year-Books*, **1906,** 110; **1891,** 160.)

Squill, Digitalis and Strophanthus, Comparative Pharmacological Action of Tinctures of. — G. S. Haynes. (*Brit. Med. Journ.*, **1906,** 2.) In therapeutic doses tincture of squill increases the force of heart-contraction considerably more than either digitalis or strophanthus. Not only is systole more complete and prolonged, but diastole also. It slows the heart-beat more than digitalis, and, considering its relative toxicity, more than strophanthus. This, however, is its effect only so far as the peripheral vagal mechanism is concerned. It produces more vaso-constriction of the coronary vessels than either digitalis or strophanthus. Tincture of digitalis is less efficient as a cardiac stimulant than squill, in that it has not the same effect in increasing the energy of contraction of the heart. Moreover, it is not possible by altering the relative dosage of digitalis to produce a stimulant effect in any way comparable to that of squill. Digitalis has less peripheral effect on the vagal mechanism than squill.

Tincture of strophanthus, being eight to ten times more toxic than the other two drugs, can hardly be compared with equal quantities of them. Such comparisons, however, serve to confirm the experiments made on frogs, showing the greater activity of this drug. With regard to its effect on the force of the heart-beat, strophanthus occupies a position considerably below squill, and rather less than digitalis. It slows the heart more than either of the two other tinctures in equal doses. In contradistinction to digitalis and squill, strophanthus has practically no action on the coronary vessels. At first it slightly increases the outflow from the coronary veins, the result of metabolites set free by the increased work of the heart. This drug is very

apt to cause sudden death of the heart without previous excitation of the excito-motor area.

To mucous membranes digitalis is the most irritant, then comes squill, while strophanthus has very little irritant action.

In any case in which it is desirable to raise the blood pressure and stimulate the heart, squill is preferable to the other two drugs.

Strontium and Magnesium Lactates, Action of, on the Coagulability of the Blood. J. B. Nias. (*Lancet*, **1906, 2,** 436.) Magnesium and strontium lactate are found to be useful and efficient substitutes in doses of 15 to 30 grains for the salts of calcium when the latter are not absorbed from the alimentary canal.

Tannisol (*Journ. Pharm. Chim.* [3], **25,** 251) is a methylditannin obtained by the action of formaldehyde on tannin. It is an odourless and tasteless reddish-brown powder, insoluble in water and other solvents, except alcohol; soluble in dilute alkalies. It is given internally in doses of 8 grains for adults or 2 to 4 grains for children for diarrhoea and intestinal catarrh ; externally it is employed as a dressing for wounds, and for eczema, either as a dusting powder, or in the form of a 10 per cent. ointment. Tannisol has been successfully used in veterinary practice.

Theolactine (*Schweiz. Woch. Chem. Pharm.*, **45,** 114) is a double salt of sodium theobromine and sodium lactate. It is a white powder readily soluble in water, the solution being stable and gives no precipitate on adding alcohol. It is given in doses of 45 to 60 grains, or up to 90 grains in 24 hours as a diuretic.

Theophorine. F. Zernik. (*Apoth. Zeit.*, **21,** 898.) Theophorine is stated to be a compound of sodium theobromine and sodium formate. It is obtained by treating theobromine with a slight excess of NaOH ; the solution so obtained is precipitated with 6 times its volume of alcohol, and the precipitate having been washed with alcohol, is dried. It is then dissolved in water and to every 70 Gm., 13 5 Gm. of anhydrous sodium formate, dissolved in water, is added. The mixture is then filtered and evaporated to dryness on the water-bath. The product is a white, sweetish powder, soluble in water. It contains 62 per cent. of theobromine, considerably more than is present

in diuretine and similar theobromine compounds. It is given in doses of 15 grains as a diuretic.

Tiodine. (*Pharm. Zeit.*, **52**, 429.) Thiosinamine-ethyl iodide, $C_6H_{13}N_2SI$, obtained by heating together thiosinamine and ethyl iodide in equimolecular proportions under a reflux condenser, is a white crystalline body, m.p. 68°C.; readily soluble in water, less so in alcohol. It is prescribed for tabes and other syphilitic affections, in the form of pills, containing 1½ grains, to be taken twice daily; and as a hypodermic injection, as a 10 or 20 per cent. solution in water, 1 c.c. of which is administered every other day, the pills being given on the day in which the injection is not used. This injection is quite painless.

Tuberculosis, New Diagnostic Ophthalmic Test for. H. Calmette. (*Comptes rend.*, **144**, 1324.) When 1 drop of a 1 per cent. aqueous solution of dry tuberculin prepared by means of 95 per cent. alcohol, is dropped into the eye of a tuberculous patient, a very pronounced reaction is produced. Five hours after the instillation, and sometimes sooner, marked congestion of the palpebral conjunctiva occurs, which become bright red and oedematous; the caruneulus is swollen and covered with a slight fibrinous exudation. The vascular injection increases; in 6 hours the fibrinous secretion becomes more abundant, and lachrymation occurs. The lower conjunctival sac contains filaments of the fibrinous matter. The patient experiences no pain except a slight smarting and the discomfort of impaired vision from the abundant secretion. The reaction reaches its maximum in about 6 to 10 hours. In 18 hours with children, and 24 to 36 hours with adults, the congestion commences to subside and disappears. The temperature is not sensibly affected. With non-tuberculous patients practically no reaction occurs. There may be, at the most, a slight reddening of the conjunctiva in 90 minutes to 3 hours which quickly disappears and is not accompanied by any fibrinous secretion nor lachrymation. A positive reaction has been obtained with all the tuberculous cases treated. From the ease with which the test may be applied, and its apparent reliability, it should prove to be of great service as a diagnostic reaction.

Tylmarin (*Apoth. Zeit.*, **22**) is the trade name for acetylcoumaric acid, $C_6H_4{\cdot}(O{\cdot}OC{\cdot}CH_3)CH{\cdot}CH{\cdot}COOH$. It occurs in colourless crystals very soluble in water. Dose, 5 to 10 grains.

Urogosan. S. Boss. (*Med. Klin.* through *Nouveaux Remèdes*, **23,** 170.) A combination of gonosan with formalin has been introduced for the treatment of gonorrhoeal infections of the bladder, on which organ it acts as a sedative antiseptic. Although gonosan is an efficient remedy for ordinary gonorrhoea, it fails when streptococci are present as well as gonococci. In these cases urogosan has been found to be useful.

Valerian, Pharmacodynamic Action of the Alkaloid and Glucoside of. S. Pouchet and — Chevalier. (*Journ. Pharm. Chim.* [6], **25,** 636.) The enormous difference in the physiological action of fresh and dry valerian is due to the presence in the former of an alkaloid and a glucoside, both very unstable ; these disappear during the process of drying the drug, and are not found in its ordinary galenical preparations. Operating on 250 kilos of the fresh root, and checking their results by physiological tests at each step, the authors have been able to confirm the existence of these bodies, as well as of a physiologically active resin, and in addition to the known essential oil. The alkaloid acts energetically on the nervous and the cardiovascular systems ; on animals it is a powerful sedative of the cerebral centres, which explains the therapeutic value of the preparations of the fresh root in hysteria and especially in epilepsy. The glucoside is less active ; it does not affect the heart but reacts on the nervous centres. In view of the unstability and toxicity of valerian alkaloid, its use, as such, in medicine is not anticipated ; but its value as a remedial agent in the form of preparations of the fresh plant is incontestable. (See also p. 173.)

Validol in Gynoecology. — Muller. (*Nouveaux Remèdes*, **23,** 97.) Validol (*Year-Book*, **1898**, 226) is a most useful remedy in doses of 5 to 15 drops, 3 times a day, on sugar, in the various nervous affections of women. It is not only more effective but much more pleasant to take than the infusion of valerian usually prescribed in these cases. It acts simultaneously as a cardiac stimulant and as a nervous sedative. Its good effects are not immediately obtained. From 8 to 15 days of treatment are necessary to obtain an appreciable and lasting benefit. It is specially valuable in hysterical affections with syncope, in neurasthenia, vertigo, headaches, excitability, and neurotic migraine. It is also most serviceable in dysmenorrhoea, endometritis and affections of the genital organs generally. (See also *Year-Book*, **1905,** 221.)

Veratrum viride in Nephritis. E. Pesci. (*L'Union Pharm.*, **47,** 490.) Tincture of *Veratrum viride*, in doses of 60 to 90 drops in 24 hours, or the fluid extract in doses of 10 to 15 drops, not exceeding 30 drops in 24 hours, has given good results in subacute and chronic parenchymatous nephritis with uremia, also in cases of plumbism and of arterio-sclerosis. Where rapid action is required, the tincture may be administered hypodermically in a dose of 0·25 c.c., repeated, if needed, in 30 minutes. When given by the mouth, the treatment should be suspended for 5 or 6 days after it has been followed for that time.

Veronal, Caution as to the Use and Dosage of. — Lebeaupin. (*Journ. Pharm. Chim.* [6], **24,** 478.) Veronal does not appear to deserve its reputation as a hypnotic the administration of which is unattended by secondary symptoms. In the doses usually given it often causes vertigo, muscular asthenia, loss of appetite, and even vomiting, visual hallucinations and neuralgia; these effects are produced many hours after the dose, sometimes the following day after a profound sleep induced by the drug. It has been known to occasion grave symptoms and even to produce fatal results. It should therefore be prescribed with the greatest circumspection; and before administering the medium dose generally recommended, 7½ grains, the susceptibility of the patient to the drug should be determined. In this the author was supported by C. Amat, Bousquet, Bardet and Laufer, who recommend that the initial dose should be 3 to 5 grains.

Vinopyrine. (*Pharm. Centralh.*, **48,** 291.) This is a combination of paraphenetidine and tartaric acid and is similar, if not identical, with tartrophene. It is a white crystalline powder, soluble in 25 parts of water, decomposed by alkalies. The dose is 15 grains.

Viscum album for Haemoptysis. W. R. Gaulthier. (*Lancet*, **1906, 2,** 129.) Ethereal extract of mistletoe in doses of 1½ grains daily, in pills, has been found to arrest pulmonary haemorrhage in 7 out of 8 tuberculous patients treated. In the case which was not ameliorated, the haemorrhage was found, after death, to proceed from an aneurism which was not amenable to treatment. Patients under the influence of ethereal extract of mistletoe showed an obvious fall in the arterial blood pressure, and an accelerated pulse.

PHARMACY

PART III

PHARMACY

Acetone Collodions. G. M. Beringer. (*Amer. Journ. Pharm.*, **78**, 470.) The use of acetone in certain varnishes has suggested its application in collodions. It is, moreover, the solvent employed in the so-called liquid corn plasters. It is an excellent solvent of pyroxyllin and of most of the drugs usually compounded with collodion.

Acetone collodion. Pyroxylin, 5; camphor, 1; acetone to make 100 fluid parts. Dissolve in 90 fluid parts of acetone then add the rest. With good pyroxylin, solution is rapid; otherwise, standing and decantation are necessary. Acetone collodion evaporates a little more slowly than the alcohol-ether form; but it yields a much stronger film which is flexible without adding other ingredients.

Acetone cantharides collodion. Cantharides in No. 6 powder, 60; pyroxylin, 4; camphor, 1; acetone, q.s. Moisten the cantharides with 35 c.c. of acetone, pack in percolator and macerate for 24 hours; then slowly percolate to exhaustion. Reserve the first 80 c.c. and evaporate the remainder at a low temperature to a soft extract. Mix with the reserve and dissolve the pyroxylin and camphor in the mixture; finally add more acetone to make the volume 100 fluid parts.

Styptic collodion cannot be prepared with acetone, for the addition of pyroxylin to the solution of tannin in acetone causes a precipitate.

Adrenaline, Method of Preparing the Solution of. C. E. Vanderkleed. (*Proc. Amer. Pharm. Assoc.*, **1906**, 392.) One hundred pounds of pulped glands are mechanically agitated for several hours with a solution of 700 Gm. of trichloracetic acid in 20 litres of alcohol. After macerating for 1 or 2 days, the magma is drained and pressed. The marc is again agitated

with more of the menstruum and extracted as before. The first obtained liquid is filtered, the filtrate concentrated to a thick syrup *in vacuo*. When cool it is filtered through a suction filter and poured into a 20 per cent. solution of lead acetate in slight excess; the quantity must be determined by experiment. The mixture is placed on ice for 2 hours and then filtered. The filtrate is poured into four times its volume of alcohol, placed on ice over night, then filtered; the filtrate is warmed, and excess of lead acetate is removed by means of SH_2. It is again placed on ice over night, then filtered, and distilled *in vacuo* with a little animal charcoal, and concentrated to about 2,500 c.c. The second extract is treated in the same manner, using about half the quantities of the various solvents and reagents. The products are then bulked, and the amount of adrenaline determined by von Fuerth's method. For this the following reagents are required:—(1) A freshly prepared solution of pure pyrocatechin, 0·6 Gm. to 1 litre. (2) A 24 per cent. solution of $NaKC_4H_4O_6$ containing 18 per cent. of $Na_2CO_310H_2O$. (3) A 5 per cent. solution of Fe_2Cl_6. Twin colour cylinders are employed for the test into one of which 3 c.c. of the pyrocatechin solution is introduced, 1 c.c. of the $KNaC_4H_4O_6$ solution added, and exactly 0·3 c.c. of the Fe_2Cl_6, and the contents thoroughly mixed. The sherry brown tint is equivalent to 3 c.c. of adrenaline solution, 1 : 1,000. Aliquot portions of known volume of the above solution are tested with the same reagents to match the colour of the pyrocatechin solution. The strength being thus determined sufficient sterile solution of NaCl, to give 0·7 per cent. of NaCl in the finished product, is added, also 0·25 per cent. of boric acid; 0·25 per cent. of Na_2SO_3 should also be added to retard oxidation and 0·075 per cent. of $CHCl_3$ to maintain sterility when the bottle is opened. The volume is then adjusted to a strength of 1 : 1,000 of adrenaline. In the above colorimetric method it is imperative that the pyrocatechin solution should be quite fresh.

The pyrocatechin method is not available for testing commercial adrenaline solutions since the preservatives these contain interfere. The following method is then employed:—One Mgm. of adrenaline is dissolved in 10 c.c. of water. To this 5 c.c. of N/10 iodine solution is added, and after 15 minutes, starch paste, and the excess of iodine is exactly reduced with N/10 thiosulphate until the blue colour is just succeeded by a rose tint. This is diluted to 50 c.c. and kept as a standard.

As it fades, it may be matched with red litmus. The sample to be tested is then treated in a similar manner.

Adrenaline Solution. H. Finnemore. (*Pharm. Journ.* [4], **24,** 586.) Adrenaline, 0·10; chlor-butyl alcohol, 0·50; sodium chloride, 0·90; diluted hydrochloric acid, 0·25; sulphurous acid, 0·25; distilled water, sufficient to produce 100·00.

Boil the distilled water for 2 or 3 minutes; cool; in the nearly cold liquid dissolve the chlor-butyl alcohol and the sodium chloride. When quite cold, add the diluted hydrochloric acid and the sulphurous acid to 25 parts of the liquid, and in this portion dissolve the adrenaline. Mix with the remainder, and make up to volume with recently boiled and cooled distilled water.

Chlor-butyl alcohol is added to this solution because of its local anaesthetic and hypnotic properties. It is soluble in the proportion of 1 in 200, so that the above solution is saturated. If a few crystals remain undissolved, they must be filtered out. The sodium chloride is in the proportion necessary to form a solution of the same osmotic pressure as normal blood serum. The hydrochloric acid is slightly in excess of theory, but is the smallest quantity necessary for commercial samples.

The above formula has been in use about two years, and the product seems quite satisfactory.

Anal pruritus, Ointment for. — Sabouraud. (*Journ. Pharm. Chim.* [6], **25,** 129.) Lanoline, purified wood tar of each, 5; vaseline, 20; zinc oxide, 7.

Anthrasol and Zinc Oxide Paste for Eczema. A. Sack. *Merck's Jahresberichte*, **20,** 37.) Anthrasol, 1; olive oil, 8; zinc oxide, 10, are rubbed down together. This is more efficacious for the treatment of eczematic affections than anthrasol glycerin preparations.

Antiseptic Perborate Ointment. — Maget. (*Apoth. Zeit.*, **22,** 7.) White vaseline, 20 Gm.; sodium perborate in finest powder, 4 Gm.; sandalwood oil, 10 drops. Mix. Care must be taken that all contact with moisture be avoided, or the perborate will be decomposed. With this precaution the ointment keeps well. On contact with moist surfaces, nascent oxygen is given off, which acts as a powerful disinfectant.

Aqua carminativa. (*Ph. Austr. VIII.; Pharm. Centralh.*, **47**, 710.) Peppermint leaves, dried, Roman chamomile flowers, fennel fruits, coriander fruits, caraway fruits, bitter orange peel, of each, 15, are crushed and distilled with steam to obtain 1,000 parts of distillate.

Baths of Cade Oil or other Tar Products. V. Mibelli. (*Svensk. Farm. Tidsk.*, **1907**, [4]; *Apoth. Zeit.*, **22**, 267.) Cade oil, 67, is treated in a capacious tinned copper vessel to 100°C. with powdered rosin, 11·1; when the rosin has dissolved the temperature of the mixture is allowed to fall to 65–70°C., when 21·9 parts of NaOH solution, sp. gr. 1·161 is poured in a little at a time, with constant agitation. A clear semi-transparent mixture is thus obtained, water is then added with stirring, so as to obtain a permanent emulsion. From 100 to 150 Gm. of this is sufficient for a bath. *Anthrasol* may be similarly treated, using the following proportions:—Anthrasol, 25; rosin, 10; NaOH solution 10 per cent., 4.

Benzoated Lard. D. B. Dott. (*Pharm. Journ.* [4], **23**, 431.) The amount of benzoin prescribed in the B.P. is not sufficient to invariably prevent rancidity; the Ph. G. IV. directs the use of 1 per cent. of benzoic acid for this purpose, which appears to preserve the lard, but the odour of the preparation is poor. The author advocates the use, instead of benzoin, of 60 grains of benzoic acid and 40 grains of prepared storax to each pound of lard. The optional use of white beeswax, as allowed by the U.S.P., is also desirable.

Benzoates, Solubility of Certain, in Water. R. Paietta. (*Boll. Chim. farm.; Journ. Pharm. Chim.* [6], **25**, 63.) *Strontium benzoate* occurs as a coarse, white, crystalline powder, with 1 mol. H_2O which it loses at 130–140°C. One hundred Gm. of the saturated solution contains the following weights of anhydrous salt at the given temperatures:—5·31 Gm. at 15·7°C., 5·40 Gm. at 24·7°C., 5·56 Gm. at 31·4°C., 5·77 Gm. at 40·9°C.

Potassium benzoate crystallizes with 3 mols. H_2O; 100 Gm. of saturated solution contain, of anhydrous salt 41·1 Gm. at 17·5°C., 42·4 Gm. at 25°C., 44·0 Gm. at 33·3°C., 46·6 Gm. at 50°C.

Neutral lead benzoate with 1 mol. H_2O contains in 100 Gm.

of solution the following quantities of anhydrous salt :—0·149 Gm. at 18°C., 0·249 Gm. at 40·9°C., 0·310 Gm. at 49°C.

Zinc benzoate is anhydrous; it is more soluble in cold water than in hot. One hundred Gm. of its saturated solution contains 2·55 Gm. at 15·9°C., 2·05 Gm. at 31·3°C., 1·862 Gm. at 49·8°C., 1·45 Gm. at 59·0°C.

British Pharmacopoeia, 1898, Recommendations of the Committee of Reference in Pharmacy respecting Certain Published Criticisms. (*Pharm. Journ.* [4], **23,** 629.) *Acaci gummi.*—The Committee does not support Alcock's suggestion to limit the insoluble matter to 0·2 per cent. A small proportion of insoluble matter might disqualify a very good gum, and there does not appear to be any necessity for such a provision.

Acetanilidum.—Omit the test with Fe_2Cl_6, which has no value. The melting point might be fixed at 113°C.

Acidum aceticum.—Commercial samples often contain higher fatty acids—e.g., butyric acid—and a test should be inserted for their detection.

Acidum aceticum glaciale.—Titration requires 98·9 per cent., while the melting-point requires 99·5 per cent. The fifth line of characters and tests should read therefore: "and does not entirely melt until the temperature rises above 14·7°C."

Acidum boricum.—Thomson's method of titrating with alkali in presence of glycerin might be substituted for the present quantitative test, and should indicate 98 per cent. at least. There is no test for free H_2SO_4 in the present B.P.

Acidum carbolicum liquefactum.—The proportion of water should be increased in order to lower the temperature of solidification. Fifty grains of phenol in each fluid drachm would be a convenient proportion.

Acidum gallicum.—The statement about tartarated antimony is incorrect.

Acidum oleicum.—The tests are rather too stringent, and exclude good commercial samples suitable for medicinal use.

Acidum phosphoricum concentratum.—The U.S.P. volumetric test appears to be simpler than the B.P. test with lead oxide.

Acidum tannicum.—The presence of water of crystallization is doubtful.

Aconiti radix.—The official description sufficiently excludes the Japanese variety, and this is necessary owing to the undoubted

difference in the nature and physiological action of the alkaloids contained in the two drugs. The assay for total alkaloid has been decided upon and undertaken by the Brussels Conference. A process of assay for ether-soluble alkaloid only, which would be chiefly aconitine, would be preferable.

Adeps.—The iodine value should be introduced. The saponification number is not necessary. The monograph requires rewriting.

Adeps benzoatus.—Benzoated lard should be prepared with Sumatra benzoin. There is no advantage in using Siam benzoin, which contains no greater quantity of benzoic acid, the preservative required, and is of less agreeable odour.

Adeps lanæ.—Elborne's modification of the cholesterin test is unnecessary. The iodine value does not appear to be of much use; it is not included in the Austrian, Dutch, or U.S.P.

Aether.—It should distil at a temperature not under 34°C.

Aether purificatus.—The test for aldehyde should be carried out with solid caustic potash and not solution of potash. Ether always gives the reaction after exposure to light, and should be stored in a dark place. The test by odour requires more detailed instructions.

Aloe barbadensis.—There is no sufficiently accurate method for determining aloin, although one is desirable. The monographs for aloes require complete revision.

Ammoniacum.—The limit of matter insoluble in alcohol should be made the subject of further experiment. The ash should not exceed 7 5 per cent.

Ammonii carbonas.—The requirements of the volumetric test should be slightly lowered.

Amyl nitris. -Omit the words "the bulb of the thermometer not dipping below the residual fluid."

Amylum.—Experiment is wanted with different starches, to determine their relative covering power, and any possible differences in the mucilages they yield. The reaction to litmus is not fulfilled by the majority of commercial starches, which are, as a rule, maize starch.

Anethi et Anisi fructus.—It is necessary that some process should be included for determining whether these fruits, in common with other umbelliferous fruits, and fruits used for the distillation of essential oil, have been partially exhausted or not. It is a well-known fact that caraway fruits, fennel

fruits, and cloves are partially exhausted of their oil and are put upon the market again mixed with unexhausted fruits. This does not apply so much to anise, which is not much used for the distillation of essential oil, the bulk of the anise oil in commerce being the oil of star anise. Probably the ether-extract would be the most convenient method of detection.

Antimonii oxidum.—Antimonous oxide is completely soluble in $KHC_4H_4O_6$ only when freshly prepared. As it is little used, very few samples taken in pharmacies can pass the test. Alcock's suggestion, dissolving in HCl in the cold with the addition of $NaKC_4H_4O_6$ and excess of $NaHCO_3$ before titrating with N/10 I solution, is preferable to the official method.

Antimonium sulphuratum.—The product made by the official process will not comply with the tests given in the B.P.

Antimonium tartaratum.—Alcock's modification, of adding Rochelle salt, as in the examination of *Antimonii oxidum*, is also available here.

Apomorphinæ hydrochloridum.—Should be soluble in 59 (not 50) parts of water. One Gm. dissolves in 48 c.c. of per cent. alcohol (90 per cent.?)

Aqua cinnamomi.—Assay process required.

Araroba.—As this is used only as a source of chrysarobin, there is no object in raising the requirements; presumably the crude drug will be omitted.

Argenti oxidum.—The weight of silver left after heating the oxide might be introduced as a quantitative test.

Arnicæ rhizoma.—Although not much used in powder, this, in common with certain other rhizomes with small roots, should have an ash figure quoted, as a means of ensuring freedom from excess of earthy matter.

Arsenii iodidum.—The salt should be directed to be recrystallized, so as to exclude the use of a melted mixture of arsenium and iodine, which is very indefinite in composition. Its aqueous solution should be *acid* to litmus, and colourless.

Asafetida.—The monograph requires complete revision.

Balsamum peruvianum.—The official drug is already assayed for cinnamein, but the test requires revision. The saponification should refer to a definite weight of residue; the cupric acetate test for colophony might be introduced, and, if possible, one should be framed which would exclude artificial substitutes.

Balsamum tolutanum.—The test requires revision.

Belladonnæ folia.—The suggestion of the International

Conference at Brussels was that the dried leaf only should be used. If this is carried out, presumably the green extract prepared from the fresh herb will be omitted. The anatomical characters should be framed so as to exclude *Scopola* leaves.

The Committee is of opinion that, from some points of view, belladonna leaves are to be preferred to the root as a starting-point for galenical preparations of belladonna, owing to the fact that the ratio of alkaloid to extractive is not so variable.

Belladonnæ radix.—If this is retained in the Pharmacopoeia, then in order to have preparations of uniform physical characters the root must be of a definite standard, and the Committee would suggest a limit between 0·4 and 0·5 per cent. of total alkaloids. This may seem a somewhat narrow margin, but it is the margin between which the majority of good belladonna root of commerce falls.

Benzoinum.—For Sumatra benzoin, 10 per cent. insoluble in alcohol, and 5 per cent. of ash, seem fair limits. The two varieties of benzoin should be described separately, and the permanganate test given to distinguish the Sumatra variety. It is a question, however, whether there is any object in retaining Siam benzoin, and for those preparations in which the benzoic acid only is required it might perhaps be well to introduce the Palembang variety, which contains the highest proportion of that acid.

Bismuthi carbonas.—Determination of bismuth in this and other official salts is better made as oxide than as sulphide. The percentage of Bi_2O_3 should be 89–91.

Bismuthi salicylas.—The U.S.P. test for the free salicylic acid is better. Five Gm. treated with 30 c.c. purified ether should yield not more than 3 Mgms. of salicylic acid.

Bismuthi subnitras.—The percentage of bismuth in this preparation should be raised.

Caffeina.—Caffeine loses its water of crystallization by keeping under ordinary conditions, and samples do not show the loss at 100°C. stated in the B.P.

Caffeinae citras.—The formula for making this preparation requires revision, and the tests also.

Calcii chloridum.—The formula given corresponds to a crystalline variety which is not obtainable under the conditions described. The characters and tests are very vague, but are most nearly descriptive of anhydrous calcium chloride. This

might be made official, with an allowance for moisture absorbed by so deliquescent a substance.

Calcii phosphas.—The description is obscure and may be understood to allow the use of both $Ca_32(PO_4)$ and $CaHPO_4$.

Calumbae radix.—The microscopic characters should be given, and also an ash percentage.

Calx sulphurata.—In the copper test a definite quantity of acid should be prescribed to be added in portions and not all at once.

Cambogia.—If this is retained, not more than 30 per cent. should be insoluble in alcohol. Much of the gamboge in commerce does not yield as much as 70 per cent. to alcohol (90 per cent.).

Cannabis indica.—If a yield to alcohol is included, then it should be higher than that of the Ph. Aust., which is 8 per cent., and certainly not lower than the 10 per cent. required by the Ph. Batav. Our experience is that for good *Cannabis indica* the yield to 90 per cent. alcohol is rarely less than 11 per cent.

Cantharides.—This drug should be assayed to contain 0 5 per cent. total cantharidin. The different processes should be compared. The process of Greenish and Wilson is quite satisfactory; but other processes have been published since, and it would be advisable to make comparison of all of them.

Capsici fructus.—Restrict the drug, as now, to the fruits of *Capsicum minimum.* As it is used largely in the form of powder, standards for ash and oleoresin should be introduced. There is, however, a difficulty in the introduction of a standard for oleo-resin, arising from the varying proportion of fixed oil, which is extracted by such solvents as remove the oleo-resin. Experiments will be necessary with various solvents, with a view to extracting the oleo-resin without the fixed oil. The microscopical characters of the entire drug, as well as of the powder, should be introduced.

Cardamomi semina.—The percentage of ash should be raised to 6 per cent. as a maximum. As the finely powdered seeds are used, microscopical characters of the powder should be given.

Caryophylla.—A limit of ether extract should be included, as the quality of cloves cannot be conveniently judged without it. Partially exhausted cloves are sold for mixture with natural cloves either whole or in powder. The ash percentage should be included.

Catechu.—The standard should not be raised without further

investigation. Dietrich's gambier-fluorescin test might be introduced, and further details also for the test for starch.

Cera.—It is necessary that two separate monographs should be included for white and yellow wax. For yellow beeswax certain other details are necessary in addition to those in the present monograph. The present test for paraffin is inadequate and should be revised. The solubility tests should be made more definite.

The monograph for white wax must be one for chemically bleached white wax, and the characters will be slightly different from those for the natural yellow variety.

Cerii oxalas.—It would be better to omit the formula, as the substance originally used in medicine and supposed to be cerium oxalate is now known to have been a mixture of cerium oxalate with many other allied oxalates. Pure cerium oxalate is now obtainable, but it is not known if this would have the desired medicinal effect.

Cetaceum.—The monograph requires complete revision. The saponification number (possibly 125 to 130) should certainly be introduced.

Chloral hydras.—The quantitative test requires some modification and more detailed directions. The isonitrile test should be added. The temperature of solidification also requires alteration.

Chloroformum.—The test by odour would be more conveniently carried out with 10 c.c. instead of 20 c.c. The sulphuric acid test requires revision.

Cimicifugae rhizoma.—The inclusion of an assay for alcoholic extract in this drug is not favoured. The section of the rhizome should be described, and the ferric chloride test made with an infusion.

Cocae folia.—The drug should be restricted to the Bolivian variety, either as grown in South America or in Ceylon.

If the galenical preparations of the drug are retained it would be advisable to have a limit of alkaloids for the leaves, and the Committee would suggest as a fair one 0·5 per cent. of total alkaloids.

Cocainae hydrochloridum.—The permanganate test as described in the B.P. is altogether unreliable, and should be modified as described in the U.S.P.

Codeina.—In the colour test, sodium arsenate should be

substituted for potassium ferricyanide. Add to the tests "codeine which has been dried at 100°C., melts at 155°C."

Codeinae phosphas.—The formula should be $C_{18}H_{21}NO_3$ $H_3PO_42H_2O$.

Colchici semina.—It is suggested by the International Conference that the seeds only, and not the corms, should be used for galenical preparations. There is considerable variation in the alkaloidal strengths of the seeds—from 0·5 to 0·8 per cent.—and an assay of the finished preparations should be included.

Colocynthidis pulpa.—Ash values should be included—both minimum and maximum—which might be 9 and 12 pei cent. respectively. A limit for fixed oil, as shown by extraction with petroleum spirit, should be included. Microscopica l characters of the powder are most necessary.

Conii folia.—Presumably the leaves will be omitted, and any preparation included made from the fruits.

Conii fructus.—These should be assayed, and also probably the finished preparations. The U.S.P. has fixed a minimum of 0·5 per cent. of conine, which is too low.

Cubeba fructus.—As much is used in powder, and there are numerous substitutes in commerce, either intentional or accidental, the genuine fruits should have microscopical characters carefully detailed. There should also be an ash limit, and a standard for oleo-resin (not less than 17 per cent.).

Crocus.—This drug will probably be omitted. If it is not, there is very little to complain of in the present official monograph.

Digitalis folia.—Chemical assay appears impossible, and physiological assay not feasible. Presumably, therefore, some directions must be given for the careful drying and storing of the leaves.

An ash limit should be given, and the microscopical characters revised.

Emplastrum belladonnae.—An assay process is desirable; the processes that have been recommended should be tried.

Extractum belladonnae alcoholicum.—The wording should be more definite; the product should be required to be in the form of a dry powder.

Extractum belladonnae liquidum.—The process of assay requires amendment.

Extractum belladonnae viride.—The extract should be stan-

dardized to contain 1 per cent. of alkaloid, and an assay process inserted.

Extractum cannabis indicae.—The process requires improvement, the product of the present one being liable to variation in physical characters.

Extractum cascarae sagradae liquidum.—The present proportion of alcohol is insufficient, and the process requires amendment.

Extractum cinchonae liquidum.—The official assay process requires amendment.

Extractum cocae liquidum.—The preparation should be standardized, and the various published processes recommended for this purpose should be investigated.

Extractum hyoscyami.—The extract should be standardized and an assay process introduced.

Extractum ipecacuanhae liquidum.—The process for making this is unsatisfactory, and one should be adopted in which the use of lime is entirely avoided. The method of assay is unsatisfactory, and requires amendment.

Extractum jaborandi liquidum.—If retained should be standardized and a method of assay given.

Extractum nucis vomicae liquidum.—The process for making this should be modified so as to ensure the absence of fat from the finished product. The assay process is not satisfactory, and requires thorough revision.

Extractum pareirae liquidum.—The process needs alteration.

Extractum strophanthi.—It is desirable to standardize this, but no process of assay should be adopted without thorough investigation.

Ferri arsenas.—The titration of ferrous iron is of doubtful value, and should be supplemented by determination of the arsenium.

Ferri et ammonii citras.—The U.S.P. has adopted the iodometric method for the determination of the iron, which is preferable to the present B.P. method.

Ferri sulphas exsiccatus.—Reference to temperature for drying should be omitted, or a temperature of 100° to 110°C. mentioned.

Ferrum redactum.—The U.S.P. adopts a limit of 1 in 100,000 for arsenic, and 90 per cent. for metallic iron. The last test is too stringent.

The U.S.P. also employs an iodometric method for the determination of the iron.

Ferrum tartaratum.—An iodometric method for the determination of the iron is preferable to the official process.

Galbanum.—Fifty per cent. should be the maximum proportion insoluble in alcohol; the ash should not exceed 10 per cent.

Gelsemii radix.—Ash limit not necessary.

Glycerinum acidi borici.—The process requires amendment with the view of producing a more uniform result.

Glycerinum pepsini.—A method for testing its activity should be given.

Glycyrrhizae radix.—The powder of this drug, as imported from abroad, has been found to be grossly adulterated with olive stones, etc.; ash determination and microscopical characters should therefore both be included. There is also so great a variation in the extractive of liquorice root that it might be desirable to include a test of either the extractive or the glycyrrhizin value.

Gossypium.—"*Solution of copper ammonio-sulphate*" should read: "Ammoniacal solution of cupric oxide."

Granati cortex.—Presumably this drug will be omitted; if it be not, there is little necessity for ash figure, as it is not used in powder.

Guaiaci resina.—Not less than 90 per cent. soluble in alcohol, not more than 3 per cent. of ash. Experiments should be made with the acid value.

Hamamelidis cortex et folia.—Ash limit not necessary.

Hydrargyri oleas.—The oleate made by direct combination of mercuric oxide and oleic acid is better.

Hydrargyrum ammoniatum.—The standard of mercury is too high, and not attainable in practice. It should not be higher than 77 per cent., and the preparation should be directed to be dried at a temperature not exceeding 30°C.

Hydrastis rhizoma.—Ash limit necessary.

Hyoscyami folia.—The Brussels Conference has decided to make the extract from the dried leaves and standardize it. Both tincture and extract might be made from a liquid extract, and one standardization process serve for the two.

An important question arises, however, as to the properties of henbane and the principal use of henbane as a sedative—whether it has not rather some other effects, principally diuretic,

and whether it would be desirable to standardize henbane preparations to proportion of mydriatic alkaloids, seeing that other more powerful drugs, having practically the same active principles, are included in the B.P. From reported observations the Committee is of opinion that if the drug is retained at all, it should not be retained on the grounds of its importance as a competitor, as it were, with belladonna.

Ipecacuanha radix.—The Brussels Conference has decided that only the Brazilian root, containing 2 per cent. of total alkaloid, is to be used. Experiments are desirable as to whether it would not be preferable to introduce solutions of emetine as expectorants, and solutions of cephaeline as emetics; or make two series of preparations from the Brazilian and Carthagena varieties for the two different purposes. If it is decided to retain only the Rio variety, either as imported from Brazil or as cultivated in India, then there does not appear to be any insuperable difficulty in the determination of the emetine value by the preparation process of Paul and Cownley.

Jaborandi folia.—If the drug is retained, *Pilocarpus microphyllus* should be substituted for the present official variety, and the galenical preparations standardized. A limit might be fixed for leaves of 0·5 to 0·75 per cent. of total alkaloid. The ratio of pilocarpine to other alkaloids appears to be practically constant in this variety.

Jalapa.—Retain the standard as at present, and give a description of powder on the general assumption that it is a drug which the pharmacist is not able to powder for himself.

Kino.—The solubility is a matter for investigation.

Linimentum aconiti.—Standardization is desirable if a reliable process can be found.

Linimentum belladonnae.—The insertion of an assay process is desirable.

Linimentum camphorae.—A method for determining the percentage of camphor should be given, and a minimum limit fixed.

Linimentum terebinthinae.—The formula needs modification.

Liquor ammoniae fortis.—The specific gravity and the percentage of ammonia are not in agreement. The official specific gravity 0·891 corresponds to 31·5 per cent. NH_3, instead of 32·5 per cent. H_2SO_4 should be substituted for HCl in the test

for "tarry matters." Absence of residue after evaporation and ignition would be a useful test.

Liquor ammonii acetatis.—The concentrated preparation, 1 to 7, should be introduced in the place of this, together with a test for lead, the sp. gr., and an amended test for neutrality.

Liquor bismuthi et ammonii citratis.—The formula requires alteration. The processes that have been suggested should be investigated.

Liquores concentrati.—If these are retained, all the formulae, with the exception of that for quassia, will require amendment, and the published recommendations should be tried and reported upon.

Liquor ferri perchloridi fortis.—A solution of sp. gr. 1·40 will not yield the quantity of ferric oxide stated. The sp. gr. might be altered to 1·49; the yield of oxide would then be 1·6 Gm. from 5 c.c.

Liquor hydrargyri perchloridi.—Should be preserved in amber bottles.

Liquor hydrogenii peroxidi.—In the gasometric assay, $MgSO_4$ solution should be used in place of brine. Volumetric processes with iodine and thiosulphate or potassium bichromate would be preferable. Tests for limit of free acid and for fluoride should be added.

Liquor morphinae hydrochloridi.—Reduce the acid to 1 c.c. and the alcohol to 20 c.c.

Liquor pancreatis.—Glycerin should be added in the formula, and the test should be modified.

Lithii carbonas.—The analytical data actually work out to 99·5 per cent. and not 98·5 per cent. as stated; this standard. is difficult to attain. A volumetric test, as in the U.S.P., would be better.

Lithii citras.—The loss of weight stated to occur at 115·5°C. is incorrect. The last portions of water are removed only at about 140°C. The formula should be altered to $Li_3C_6H_5O_7 5H_2O$; this fully hydrated salt loses 24 per cent. of its weight in drying at 95–100°C.

Lupulinum.—Presumably this drug will be omitted, as it is practically never used. The proposed raising of the ash figure would admit more rubbish than at present. The figure of 10 per cent. is certainly high enough if the drug is to be retained.

Magnesia levis.—See note under *Magnesia ponderosa*.

Magnesia ponderosa.—This absorbs moisture and CO_2, and some allowance should be made for loss on ignition and for presence of carbonate.

Magnesii carbonas levis.—The composition of this varies within certain limits, and cannot be represented by a definite formula.

Mel.—The monograph requires complete revision. Tests for starch-sugar and cane-sugar should be introduced.

Myrrha.—The ash limit should be 5 per cent. A limit for substances insoluble in alcohol should be stated. The colour test requires revision.

Morphinae hydrochloridum.—The solubility in water is 1 in 25 and 1 Gm. dissolves in 69 c.c. of alcohol (90 per cent.). In the precipitation test the salt should be dissolved in 50 c.c. of warm morphinated water (not 250 c.c.) and the precipitated morphine should weigh 1·5 to 1·51 Gm.

Nux vomica.—The Brussels Conference has decided on a standard of 2·5 per cent. of total alkaloid. The assay process should be revised, especially if strychnine is to be determined separately, for which the U.S.P. process has been shown to be quite incorrect. The powder should be microscopically described, as is done in the recent Austrian and Dutch Pharmacopoeias.

Olea.—In all statements of solubility the temperature is most important, and pointed attention should be called to it.

Oleum amygdalae.—Iodine value (95 to 100) and saponification value (190 to 200) should be stated. The oleic acid test of the U.S.P. should be made the subject of experiment.

Oleum anethi.—A minimum of 45 per cent. of carvone as determined by fractionation might be demanded, in which case the apparatus to be employed for fractionating should be exactly described.

Oleum anisi.—15°C. should be the minimum melting point. A solubility in 3 volumes of 90 per cent. alcohol should be required.

Oleum carui.—At least 40 per cent. should distil at a temperature over 200°C. An optical rotation of +74° to +78° should be included.

Oleum cajuputi.—If it is retained a revised test will be necessary. The requirement for cineol should not be less than 50 per cent., as determined by the H_3PO_4 process.

Oleum caryophylli.—Should contain at least 80 per cent. of

eugenol, as shown by the potassium hydroxide test. Solubility in 70 per cent. alcohol should be stated.

Oleum cinnamomi.—The details of the aldehyde assay should be altered. .Minimum should be stated as 68 per cent.

Oleum copaibae.—The description needs revision.

Oleum coriandri.—Optical rotation $-7°$ to $-14°$.

Oleum cubebae.—Optical rotation $-30°$ to $-40°$.

Oleum eucalypti.—An assay process indicating not less than 55 per cent. of eucalyptol should be introduced. The sp. gr. should be raised to 0·901.

Oleum lini.—The monograph requires complete revision. Iodine and saponification values should be introduced.

Oleum menthae piperitae.—Foreign oils other than Japanese, which is excluded by the description, should be official, and the menthol, both free and combined, determined by the usual processes.

Oleum olivae.—The monograph requires complete revision.

Oleum pimentae.—Should give potash 65 per cent. of eugenol by potash method.

Oleum ricini.—The monograph requires complete revision. Saponification and iodine values should be introduced. The H_2SO_4 test needs revision if retained, but is of little service.

Oleum santali.—A santalol determination figure—possibly 94 per cent. as a minimum—should be included.

Oxymel scillae.—The process needs revision so as to ensure a product with constant physical characters.

Paraffinum durum.—The melting-point should be altered to 50–55°C.

Paraffinum liquidum.—The sp. gr. is too high. It is usually between 0·860 and 0 880.

Paraffinum molle.—The melting-point should be raised. 37–40°C. would be better.

Pareirae radix.—This drug will probably be omitted.

Pepsinum.—The monograph requires complete revision. See U.S.P., and also paper by Lucas (*Year-Book*, **1905,** 275). It is nearly insoluble in alcohol, 90 per cent.

Physostigmatis semina.—This drug will probably be omitted, and its alkaloid only retained.

Pilula ferri.—The formula should be amended, introducing glucose in the place of sugar.

Pilula hydrargyri subchloridi composita.—Omit the castor oil.

Pimenta.—The drug is not much employed in pharmacy, but as it is used in powder an ash limit should be stated.

Piper nigrum.—The characters of the powder should be given together with an ash, and possibly an oleo-resin standard.

Podophylli resina.—The question of the exclusion of Indian podophyllin is a matter requiring further consideration. A satisfactory test to distinguish the one variety from the other is not known.

Potassa caustica.—The method of preparation should be omitted.

Potassa sulphurata.—The solubility test should be modified to exclude inferior qualities. The best varieties form an opalescent solution with water.

Potassii acetas.—The formula given does not represent the substance actually in use, which cannot be rendered anhydrous on a technical scale without decomposition. An allowance of 10 per cent. water on drying at 110°C. would be reasonable.

Potassii bromidum.—The thiocyanate test might be modified as suggested by Upsher Smith (*Year-Book*, **1901**, 103).

Potassii carbonas.—The commercial article is not a definite crystalline compound with one or two molecules of water, but a mixture containing about 16 per cent. of combined water.

Potassii citras.—The formula of this salt contains one molecule of water of crystallization; the volumetric requirements do not correspond to the formula given and should be altered. The anhydrous salt can be obtained only with difficulty.

Potassii tartras.—The formula should contain half the water shown in the P.B. formula. The figures in the volumetric test are based upon the incorrect formula and require alteration.

Quininae sulphas.—The B.P. test should be replaced by that in the French Codex, which is more easily carried out. The standard of the B.P. requires a less pure quinine sulphate than any other important Pharmacopoeia. The 3 per cent. of cinchonidine obtained in the assay indicates the presence of more than twice that amount in the sample.

Rhei radix.—Ash limit is not feasible. Experiments should be made with the assay process of Tschirch. Probably it might be found of value to require a limit of extractive to 60 per cent. alcohol, which has been found a useful test.

Rhaeados petala.—These will probably be omitted.

Sapo animalis.—A test for the nature of the fatty acids

should be introduced. The allowance of moisture is very liberal.

Sapo durus.—A test for the nature of the fatty acids should be introduced.

Sapo mollis.—A limit for water should be added.

Scammoniae radix.—As the root is used only for preparing the resin probably no standard need be included. Consideration, however, should be given to the different varieties of scammony resin now being obtained from roots imported from Mexico.

Scammonium.—This will probably be omitted, as there is no object in its retention if the extracted resin is official.

Scilla.—A limit of moisture is necessary.

Senegae radix.—No ash limit is necessary.

Senna.—It should be required that the ash should be almost entirely soluble in hydrochloric acid, so as to exclude as far as possible siftings of senna, which contain sandy impurities. Detailed microscopical characters should also be included.

Serpentariae rhizoma.—An ash limit is necessary.

Sevum.—Acid, saponification, and iodine values should be given if the drug is retained.

Sodii arsenas.—The lead acetate test, which has several times been the subject of discussion, is substantially correct if carried out, as described, in an acid solution.

Sodii benzoas.—More allowance should be made for moisture —say, 4 per cent. The last portions of water are said to be difficult to remove without injuring the salt. The minimum requirement of the B.P. test is 99·25 per cent.

Sodii bicarbonas.—The test for carbonate should be replaced by one on the lines of that in the U.S.P.

Sodii carbonas exsiccatus.—A limit of water should be allowed and definitely stated.

Sodii hypophosphis.—The permanganate test should be replaced by one based upon the work of Jowett (*Year-Book*, **1898,** 409).

Sodii nitris.—The volumetric permanganate test is better than the gasometric method now official.

Sodii sulphis.—The volumetric test is best performed by adding the sulphite to iodine solution and titrating back with thiosulphate solution. The B.P. standard is too high, and is seldom, if ever, met with in commerce, even in recently-made samples.

Spiritus ammoniae aromaticus.—Amend the test for carbonate by adding ammonium chloride.

Spiritus camphorae.—A method of estimating the camphor is desirable.

Staphisagriae semina.—Experiments are necessary respecting an ash limit.

Stramonii folia.—An ash limit of 15 per cent., and microscopical characters, should be given.

Strophanthi semina.—The reaction with sulphuric acid has not proved of great value, as seeds taken from the same pod have given a green and a red reaction. A process of assay is desirable.

Strychninae hydrochloridum.—The temperature at which this is stated to lose its water of crystallization is too low. The composition of the salt needs re-investigating.

Styrax praeparatus.—Experiments should be made to determine whether purification by some other solvent (such as acetone) is not possible. Proportion of cinnamic acid, acid value, and ester value should be stated.

Succus taraxaci.—The proportion of alcohol should be increased.

Sulphur sublimatum.—Sublimed sulphur always gives an acid reaction unless freshly washed and dried. The residue left in the ammonia test might be ammonium sulphate, and is no proof of the presence of arsenic or arsenium sulphide. The arsenic test is not delicate enough.

Sulphuris iodidum.—Solution in potassium iodide and titration with sodium thiosulphate would be a better test for quality than the determination of residual sulphur.

Syrupus codeinae.—The formula should be revised.

Syrupus ferri iodidi.—The formula should be revised; a better assay process is required.

Syrupus ferri phosphatis cum quinina et strychnina.—An assay process is desirable, and the formula requires some slight alteration in detail.

Syrupus glucosi.—A monograph for glucose should be introduced with limit of arsenic and sulphites.

Syrupus pruni virginianae.—The formula requires revision.

Tinctura cardamomi composita.—The substitution of glycerin for the raisins and of oil of cinnamon for the cinnamon bark should be considered.

Tinctura cinchonae.—The assay process requires revision,

Tinctura nucis vomicae.—The assay process requires revision.

Tinctura opii and *tinctura opii ammoniata.*—The assay process requires improvement, and should be adapted to the latter preparation.

Tinctura strophanthi.—It is desirable to standardize this preparation, and investigation of the published suggestions should be made.

Unguentum acidi carbolici.—The ointment does not keep satisfactorily, and the formula needs revision.

Unguentum conii.—The formula should be revised with the view of preventing mouldiness.

Unguentum hamamelidis.—The formula should be improved in the same direction.

Vinum aurantii.—Introduce a process for detannating and give a test for tannin.

Vinum ipecacuanhae.—Improve the formula by ordering detannated wine and acidifying the liquid extract if necessary. A process for assay should be inserted.

Zinci sulphas.—After " magnesium " insert " manganese."

Zinci sulphocarbolas.—The method of manufacture would not yield a pure product. The salt contains 8 molecules of water of crystallization, not 1, as given in the B.P.

Zinci valerianas.—The official formula given for the properly prepared salt is wrong, and should be $Zn(C_5H_9O_2)_2 2H_2O$. The limits of residue stated in the quantitative test are too divergent and should be altered to not less than 26 and not more than 27 per cent. zinc oxide, which is consistent with the salt's solubility in absolute alcohol.

Zingiber.—The powdered drug should yield not more than 5 per cent. of total ash, and not less than 1·5 per cent. of soluble ash, or 5 per cent. of alcoholic extract.

Test solution of ferric chloride.—It is not necessary to use *anhydrous* ferric chloride.

Boric Acid Ointment, Antiseptic Properties of. — Max. Nyman. (*Pharm. Notisbledz.; Répertoire* [3], **18**, 542.) From bacteriological experiments it is concluded that boric acid ointment is an efficient antiseptic, provided that the amount of the acid does not fall below 10 per cent.

Cadmium Ointment, Compound. F. Richter. (*Pharm. Zeit.*, **52**, 398.) Wood's fusible alloy is melted on the steam-bath

with an equal quantity of rosin, and rubbed while in the melted condition until the metal is reduced to the finest possible state of division. The mass is then cooled, and the rosin removed by means of ether. The finely divided metallic powder is then rubbed down with vaseline to form an ointment. The ether may be recovered from the rosin solution by distillation. [Wood's fusible alloy consists of Bi, 4; Pb, 2; Sn, 1; Cd, 1; melted together. Its m.p. is 60°C. (141°F.)—Ed. *Year-Book.*]

Calcium Chloride Mixture. — Rosow. (*Merck's Jahresberichte*, **20,** 75.) To disguise the unpleasant taste of $CaCl_2$ it may be prescribed thus with peppermint:—Calcium chloride in crystals, 1; syrup of peppermint, 4; distilled water, 20. One tablespoonful in 24 hours.

This mixture is given in haemorrhagic endometritis, and as a haemostatic in unoperable uterine carcinoma.

Calomel, The Incompatibility of, with Sodium Chloride. J. Carracido. (*Revista Acad. Sci. exact.; Répertoire* [3], **19,** 223.) By cautiously floating AmOH on a solution containing traces of $HgCl_2$ a characteristic white precipitate is formed at the zone of contact of the two liquids. This is immediately evident with dilutions of 1 : 10,000; it appears in a few minutes with 1 : 30,000, but is not evident with 1 : 40,000. An approximation of the amount of $HgCl_2$ present may be made by comparing the amount of precipitate formed with those of dilutions of the salt of known strength under similar conditions. By means of this test the action of NaCl solutions of various strengths on HgCl has been determined, the reaction being obtained with the filtrate, after contact under varying conditions of temperature. In all cases evidence of the formation of a trace of $HgCl_2$ was obtained, but never more than 1 : 10,000. By replacing the NaCl with a salt broth of potatoes, and leaving this in contact with HgCl, then extracting with ether, the ethereal solution, after filtration and evaporation, gave the characteristic reaction for $HgCl_2$ with AmOH. It is evident, therefore, that, in the presence of salt, or salt food, a trace of $HgCl_2$ is formed from HgCl, but the amount formed is small and does not approach a toxic dose.

Cannabis indica, "Soluble" Preparation of. F. H. Bonnefin. (*Lancet*, **1907, 2,** 296.) Extract of Indian hemp,

1; rectified spirit, 4; concentrated decoction of quillaia (1 in 7), 7; distilled water, 8. Mix the extract with the alcohol, add the decoction of quillaia while warm; shake well, add warm distilled water, shake, set aside and strain after 3 days. The product remains clear on further dilution. In the discussion which followed the reading of the above note at the Therapeutical Society, it was stated that the preparation retained but little activity.

Cantharides Ointment with Euphorbium: Ph. Belg. III. (*Apoth. Zeit.*, **22,** 153.) Tar ointment, 37; powdered cantharides, 10; powdered gum euphorbium, 3. Mix. The above tar ointment is a mixture of wood tar, 1; white vaseline, 2; lanoline, 2.

Capitol. J. Kochs. (*Apoth. Zeit.*, **21,** 410.) This proprietary ointment, introduced as a remedy for headache, consists of lanoline, 630; water, 145; menthol, 225.

Capping Fluid for Bottles. (*Amer. Drugg.*, **50,** 43.) Yellow resin, 1; (methylated) ether, 2; (methylated) collodion, 3; aniline colour, q.s.

Carbolic Acid Ointment, Improved Formula for. J. Hamerton. (*Pharm. Journ.* [4], **24,** 55.) Phenol, 4; Camphor, 2; Hard paraffin, 8; Soft paraffin, 86; Parts by weight.

Liquefy the camphor and phenol with gentle warmth, add to the melted paraffins, stir till about to solidify, and allow to set.

Cascara sagrada and Rhamnus frangula, Preparation of the Purgative Principle of. — H. E. Knopp. (*Apoth. Zeit.*, **21,** 941.) The powdered bark is macerated in water for several hours in the cold, then drained, pressed and filtered; the filtrate is evaporated to dryness on the water-bath, and extracted with ethyl or methyl alcohol as long as any brown, soluble matter is removed. The insoluble residue is washed with alcohol, dried, and powdered. The product is again dissolved in water; alcoholic KOH is added as long as a precipitate is formed. This is collected, washed with alcohol and dried *in vacuo*. It is very soluble in water, giving a wine-red solution; insoluble in strong alcohol. It is free from bitter taste, has no odour, and possesses purgative properties.

Casein Massage Cream. M. E. Doyle. (*Drugg. Circ.*, **51, 406.**) Casein, precipitated by magnesium sulphate and alum, 100; boric acid, 20; cacao butter, 10; solution of carmine, q.s. to tint; essential oil of bitter almonds, q.s. to perfume. Add the carmine solution to the casein and rub down well; then add the boric acid; melt the cacao butter and incorporate with the casein; lastly, add the perfume.

Castor Oil, Dried. — Winternitz. (*Pharm. Zeit.*, **52,** 363.) The casein from 1 litre of skimmed milk is pressed until it contains 70 per cent. of water; 5 c.c. of 10 per cent. NaOH solution is then added with 40 Gm. of lactose and 80 Gm. of castor oil. The brown mixture is then dried *in vacuo*.

Castor Oil Mixture, Palatable. J. B. Moore. (*Amer. Journ. Pharm.*, **78,** 385.) The following method of disguising the taste of castor oil is one of the many expedients suggested for that purpose. Compound tincture of cardamoms, 2 fl. drachms; cinnamon water, 6 fl. drachms; castor oil, 1 fl. oz.; brandy, q.s. Mix the compound tincture of cardamoms in cinnamon water, add the castor oil carefully, and squirt 4 or 5 drops of brandy on the surface.

Catgut, Sterilization of, with Iodine. J. Scott Riddell. (*Brit. Med. Journ.* **1907** [2414], 809.) Iodine sterilized catgut as used by Moschcowitz is strongly recommended as being perfectly aseptic, pliable, and readily absorbed. It is prepared by macerating the gut, on glass spools, in a mixture of tincture of iodine 1, proof spirit 15, for 8 days. It can be stored indefinitely in the solution in which it is prepared without becoming brittle. The commercial catgut is tightly wound on pieces of glass rod about the thickness of the little finger, 2 inches long. This will take a convenient length in one layer. The wound spools are then merely dropped into a glass jar of the iodine solution, in which they are kept until required for use.

Catgut, Sterilization of, with Trimethyl-benzene. J. Lafourcade. (*Journ. Pharm. Chim.* [6], **25,** 254.) The gut, previously freed from fat by maceration in ether, is wound on glass bobbins, and dried in a stove at 90°C. for 2 hours. These bobbins are then placed in a small autoclave, covered with commercial trimethyl-benzene, or cumene, and slowly

heated under pressure. When the temperature reaches 160°C. the operation is terminated. After cooling down the bobbins of gut are stored in alcohol in tubes sterilized by heating under pressure with alcohol. Catgut thus treated is said to be very supple and yet firm : it is absorbed very slowly, in this respect resembling chromic acid gut.

Ceratum cetacei, Ph. Austi. VIII. (*Pharm. Centralh.*, **47,** 710.) Spermaceti, white wax, sesame oil, of each 1. Melt together with a gentle heat, and pour out to form tablets.

Chaulmoogra Oil Preparations for Dermatology. H. Unna. (*Apoth. Zeit.*, **21,** 527.) *Pills of chaulmoogra.*—Chaulmoogra soap, 10 Gm. ; fatty mass for keratin-coated pills, 5 Gm. ; anesthesine, 1·5 Gm. ; menthol, 0·1 Gm. ; kieselguhr, 1 Gm. ; water, q.s. to mass. Divide into 100 pills. Coat with keratin. Dose —5 to 8 pills daily.

Emulsion of chaulmoogra oil.—Dissolve chaulmoogra oil, 10, in almond oil, 20 ; rub down with powdered gum acacia, 15 ; and add water, 20 ; emulsify, and add lime water q.s. to make 100. To be used as a rectal injection.

Camphorated chaulmoogra oil.—Chaulmoogra oil, 1 ; camphorated oil, 9.

Camphorated chaulmoogra ointment.—Chaulmoogra oil, camphorated oil (Hamburg Formulary), equal parts.

Chenopodium Oil Emulsions as Anthelmintics. H. Bruning. (*Med. Klin.* ; *Journ. Pharm Chim.* [6], **24,** 222.) One of the following emulsions is a convenient form for administering the essential oil of American wormseed, *Chenopodium anthelminticum.*

(1) Oil of wormseed, 1 ; powdered gum acacia, 1 ; distilled water, 9 ; syrup of bitter orange, 9. Emulsify.

(2) Oil of wormseed, 10 Gm. ; yolk of 1 egg ; oil of sweet almonds 10 Gm. ; powdered gum acacia 10 Gm. ; distilled water, 200 Gm. Emulsify. The dose is 4 to 8 grains of the oil (0·25 to 0·5 G.m) 3 times in 24 hours for several days if necessary. After the last of the 3 doses a purge of castor oil is given, for the oil of wormseed acts rather as a narcotic and paralysant on the parasites, and does not actually kill them. The patient should be kept on a spare diet.

Chloroform, Indicator of Purity of. P. Breteau and P. Woog. (*Comptes rend.*, **143,** 1193.) A slice of elder pith

stained with Congo red is introduced into each bottle of chloroform. If only a trace of decomposition takes place, this turns blue.

Coconut or Almond Meal as a Substitute for Starchy Food for Diabetic Patients. — Williamson. (*Med. Chron.; Nat. Drugg.*, **37**, 91.) Ground coconut, freed from sugar by fermentation with yeast, is a useful addition to the diet of diabetics in place of farinaceous food stuffs. *Coconut cakes* may be prepared thus:—German yeast, 1 oz., is stirred up with warm water, 2 oz. This is made into a paste with finely-ground coconut, 16 oz., using more water if necessary. The mass is set aside in a warm place for 30 minutes; add 2 eggs beaten up with 3 or 4 tablespoonfuls of milk, and a little salt. Place in well-greased tins, and bake in a moderate oven for 20 to 30 minutes. Almond powder may be substituted for coconut, for variety, or when the flavour of the former is objected to. *Coconut pudding* for the same purpose is made by adding to the above fermented mass 2 oz. of butter, with salt, and a little milk; the paste is baked in a pie dish for 20 or 30 minutes until the surface is brown. It may be sweetened, if desired, with saccharin. It is a useful substitute for rice pudding.

Cod-liver Oil Emulsion with Condensed Milk. (*Proc. Amer. Pharm. Assoc.*, **1906**, 620.) Cod-liver oil, 8 oz.; condensed milk, 3 oz.; glycerin, 3 oz.; water, 2 oz.; essential oil of almonds, 15 ♏.; essential oil of wintergreen, 5 ♏. Gradually incorporate the oil with the condensed milk in a mortar. Add the essential oils, then the water, and lastly the syrup (glycerin ?). This forms a basis to which other ingredients may be added as prescribed.

Collargol, Pharmacy of. (*Pharm. Zeit.*, **52**, 312.) *Ointment.*—Collargol, 30 to 60; distilled water, 150; oil of wintergreen, 1; wool fat to make 300. *Paste.*—Collargol, 6; wheat starch, 70; zinc oxide, 70; wool fat, 50; vaseline to make 300. *Pencils.*—Collargol, 1; powdered white sugar, 20; powdered gum acacia, 15; powdered milk sugar, 10; wool fat, 5; glycerin and water q.s. to mass: to make 40 pencils. *Pessaries.*—Collargol, 1 or 2; French chalk, 1 or 2; cacao butter, 48 or 46; mould into 30 grain pessaries. *Pills.*—Collargol, 15½ grs.; milk sugar, 155 grs.; glycerin q.s. to mass. Divide into 100 pills.

Collemplastrum adhaesivum: Ph. Austr. VIII. (*Pharm. Centralh.*, p. **47,** 910.) Rosin oil, 6; purified caoutchouc, 10; petroleum ether, 45, are allowed to stand in a well-stoppered bottle with frequent shaking until dissolved. The solution thus obtained is added to the following ingredients previously mixed after gentle heating:—Copaiba balsam, resin, of each, 4; wool fat, yellow wax, sandarac, of each 2; powdered orris root, 9; ether, 16. The whole is mixed to form a uniform mass, which is spread upon linen, and the ether allowed to evaporate at the normal temperature.

Collemplastrum adhaesivum: Ph. Danic., 1907. (*Pharm. Zeit.*, **52,** 531.) Rosin oil, 15; copaiba balsam, resin, of each 10; wool fat, 5; yellow beeswax, 3; ether, 160; caoutchouc, 25; finest powdered orris root, 22; powdered sandarac, 5. The first five ingredients are melted together, strained, and when cold dissolved in ether, 120; the caoutchouc is then added and well shaken up. The orris root and sandarac are treated with ether, 40, and the two solutions are mixed. The mixture, after thorough shaking, is spread on fine linen.

Collemplastrum salicylatum: Ph. Austr., VIII. (*Pharm. Centralh.*, **47,** 710.) Salicylic acid, 4; petroleum ether, 20. Rub down the acid fine with the ether, and mix with thorough agitation in a bottle with adhesive collemplastrum mass, as above, 100. Spread on linen, and allow the petroleum ether to evaporate at the normal temperature.

Collyrium adstringens luteum: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 710.) Zinc sulphate, 5; ammonium chloride, 2; dissolve in water, 890; dissolve camphor, 2; in dilute alcohol (69 per cent.), 100. Mix and macerate in the mixture for 24 hours, with frequent agitation, saffron, 1. Filter.

Concentrated Infusions. E. H. Farr and R. Wright. (*Pharm. Journ.* [4], **24,** 621.) When 1 part of any one of the following preparations is diluted with 7 parts of water the corresponding official fresh infusion is fairly approximated. Two general methods are employed in their production.

Process of Repercolation.—Moisten one-half of the solid materials with sufficient menstruum to form a damp powder, set aside in a covered vessel for 2 hours, or until thoroughly swollen, then

pack in a percolator and percolate slowly with the menstruum. Moisten the rest of the drug with the first portion of the percolate, and, after standing for 2 hours, pack this in a second percolator, and, employing the first percolate as a menstruum, allow percolation to proceed slowly until the second percolate measures 60. To this add the alcohol and any tincture included in the formula, and reserve. Allow percolation to proceed until the marc is practically exhausted, collecting, if necessary, another 100 of percolate. Evaporate this over a water-bath to small bulk, mix with the reserved portion, and add, if necessary, sufficient of the menstruum to make the volume of the final product up to 100. Set aside for 7 days and clarify. When diluted alcohol is the menstruum percolation should only be carried on until 100 of percolate has been collected from the second percolator.

Process of Macero-Expression.—Macerate the solid ingredients in 75 of the menstruum in a covered earthenware vessel for 24 hours, using slight pressure when the whole of the drug is not covered by the menstruum. Strain, if necessary, and press the marc. To the resulting liquid add any other ingredients specified in the monograph, and reserve. Repeat the above maceration a second and a third time for 6 hours each. Evaporate the weaker pressings over a water-bath until the volume of the resulting liquor, together with that of the reserved portion, equals 100. Set aside for 7 days. Then filter. When diluted alcohol is used as a menstruum the third maceration may be omitted, and for the second maceration only enough menstruum should be employed to make the expressed liquids, when united, measure 100. The diluted chloroform water is prepared by dissolving 1 c.c. of chloroform in a litre of distilled water. This is to be used not only when diluted chloroform water is directed to be employed as a menstruum, but also in the production of the diluted alcohol used for the same purpose.

Concentrated Infusion of Bearberry.—Bearberry leaves, in No. 20 powder, 40 parts; alcohol, 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by repercolation. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Broom.—Broom tops, in No. 20 powder, 80 parts; alcohol, 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by repercolation. Before the addition of the alcohol to the reserved portion this should be heated to a temperature

of not less than 85°C., and maintained thereat for 5 minutes. *Dose.*—1 to 2 fl. drms.

Concentrated Infusion of Buchu.—Buchu leaves, bruised, 4 parts; tincture of buchu, 22·5 parts; alcohol, 90 per cent. 10 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by macero-expression. *Dose*—1 to 2 fl. drms.

Concentrated Infusion of Calumba.—Calumba root, in No. 10 powder, 40 parts; alcohol, 90 per cent., 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by macero-expression. Before the addition of the alcohol to the reserved portion, the latter should be heated to a temperature of not less than 85°, and maintained thereat for 5 minutes. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Cascarilla.—Cascarilla bark, in No. 40 powder, 40 parts; tincture of cascarilla, 7 5 parts; alcohol, 90 per cent., 20 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by macero-expression. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Chamomile.—Chamomile flowers, in powder, 40 parts; oil of chamomile, 0 2 parts; alcohol 20 per cent., sufficient to make 100 parts.

Mix the oil of chamomile thoroughly with the powder, and submit the latter to repercolation. *Dose*—As a stomachic, 1 to 4 fl. drms.; as an emetic, 5 to 10 fl. drms.

Concentrated Infusion of Chiretta.—Chiretta, in No. 40 powder, 40 parts; alcohol, 90 per cent., 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by repercolation. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Cloves.—Cloves, in No. 10 powder, 20 parts; alcohol 20 per cent., sufficient to make 100 parts.

Macerate the drug in 50 of the menstruum for 7 days, strain, pack the marc in a percolator, and percolate slowly, first with the tincture, and subsequently with the dilute alcohol, until the process is completed. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Cusparia.—Cusparia bark, in No. 40 powder, 40 parts; alcohol, 90 per cent., 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by macero-expression. *Dose*—1 to 2 fl. drms.

Concentrated Infusion of Digitalis.—Digitalis leaves, in No. 20 powder, 5·5 parts; alcohol, 90 per cent., 20 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by macero-expression. *Dose*—15 to 30 ♏.

Concentrated Compound Infusion of Gentian.—Gentian root, in No. 10 powder, 10 parts; dried bitter orange peel, in No. 10 powder, 10 parts; tincture of lemon, 10 parts; tincture of orange, 5 parts; alcohol, 90 per cent., 17·5 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Mix the tinctures with the alcohol, and repercolate the drugs with dilute chloroform water, adding the mixed tinctures to the reserved portion. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Hops.—Hops, freshly broken, 40 parts; alcohol, 90 per cent., 1; dilute chloroform water (1 in 1,000), 3, sufficient to make 100 parts.

Prepare by macero-expression. *Dose*—1 to 2 fl. drms.

Concentrated Infusion of Krameria.—Krameria root, in No. 40 powder, 40 parts; alcohol, 90 per cent., 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by repercolation. Before the addition of the alcohol to the reserved portion this should be heated to a temperature of not less than 85°C., and maintained thereat for 5 minutes. *Dose*—½ to 1 fl. drm.

Concentrated Compound Infusion of Orange.—Dried bitter orange peel, in No. 10 powder, 20 parts; dried lemon peel, in No. 10 powder, 5 parts; cloves, freshly powdered, 2·5 parts; tincture of lemon, 5 parts; tincture of orange, 5 parts; alcohol, 90 per cent., a sufficient quantity; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Macerate the powdered cloves in 20 of the alcohol for 12 hours, filter through cotton wool and pass through the marc sufficient alcohol to make the filtrate measure 20. Add the tinctures and set aside. Mix the other powders and submit them to macero-expression with dilute chloroform water, adding the mixed tinctures to the reserved portion. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Orange.—Dried bitter orange peel, in No. 10 powder, 40 parts; tincture of orange, 5 parts; alcohol, 90 per cent., 22·5 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by repercolation. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Quassia.—Quassia wood, in No. 20 powder, 7·5 parts; alcohol, 90 per cent., 20 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by repercolation. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Rhubarb.—Rhubarb root, in No.

10 powder, 40 parts; alcohol, 90 per cent., 25 parts; dilute chloroform water (1 in 1,000), sufficient to make, 100 parts.

Prepare by repercolation. *Dose*—½ to 1 fl. drm.

Concentrated Acid Infusion of Roses.—Dried red rose petals, in No. 20 powder, 20 parts; diluted sulphuric acid, alcohol (20 per cent.), of each sufficient to make 100 parts.

Moisten the powder with some of the alcohol containing one-fortieth its volume of the diluted sulphuric acid, macerate for 2 hours, then pack in a glass percolator, and percolate slowly with more of the acidulated alcohol, until 92½ has been collected. Add to this 7½ of diluted sulphuric acid, set aside for 7 days, filter. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Senega.—Senega root, in No. 20 powder, 40 parts; strong solution of ammonia, 0 5 part; oil of wintergreen, 0·15 part; alcohol, 90 per cent., 1; dilute chloroform water (1 in 1,000), 3, sufficient to make 100 parts.

Mix the powder with the strong solution of ammonia and sufficient menstruum to damp it evenly. Complete by repercolation. Dissolve the oil of wintergreen in the product. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Senna.—Senna leaves, broken small, 80 parts; strong tincture of ginger, 2 5 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by macero-expression. After completing the process, add the strong tincture of ginger. Heat in a closed vessel by means of a water-bath to a temperature of 85 C., and maintain thereat for 5 minutes. *Dose*—½ to 1 fl. drm.; as a draught, 2 fl. drms., diluted with water.

Concentrated Infusion of Serpentary.—Serpentary rhizome, in No. 20 powder, 40 parts; alcohol, 90 per cent., 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Prepare by repercolation. *Dose*—½ to 1 fl. drm.

Concentrated Infusion of Valerian.—Valerian rhizome, in No. 20 powder, 40 parts; strong solution of ammonia, 0 3 part; alcohol, 90 per cent., 25 parts; dilute chloroform water (1 in 1,000), sufficient to make 100 parts.

Mix the powder with the strong solution of ammonia and sufficient chloroform water to damp it evenly, set aside for 2 hours, and then submit it to repercolation. *Dose*—½ to 1 fl. drm.

Condurango, Liquid Extract of: Ph. Danica, 1907. (*Pharm. Zeit.*, **52,** 531.) Condurango bark in powder, 100; glycerin, 10;

alcohol, 90 per cent., 150; distilled water, 250. Macerate together for 2 hours, then percolate with a mixture of alcohol 90 per cent. 1, and water 3, so as to obtain 100 fluid parts of extract.

Creosotal, Senega, To Emulsify. — Pila. (*Bull. Comm.*, **35**, 186.) Creosotal may be readily emulsified by syrup or tincture of senega [or by the concentrated liquor]. Where much is required, a strong emulsion may be conveniently employed of the strength 1 : 3. To prepare this, syrup of senega 600 Gm. is heated to boiling, poured into a litre flask, and 200 Gms. of creosotal is at once poured in. The whole is well shaken until emulsified. This preparation keeps well and may be diluted with simple syrup as required. When another drug or preparation is prescribed with the creosotal, tincture of senega may be used as the emulsifying agent, in the proportion of 1 part to each 2 parts of creosotal ordered. Thus: creosotal, 10; tincture of senega, 5; syrup of cherry laurel, q.s. to make 200. Mix the creosotal with the tincture, shake well, then slowly incorporate the syrup.

Creosote Glycerite. A. E. Ebert. (*Meyer Bros'. Drugg.; Proc. Amer. Pharm. Assoc.*, **1906**, 631.) Beechwood creosote, 1¾ fl. oz.; alcohol, 90 per cent., 2 fl. oz.; glycerin, 5½ fl. oz.; water, 6¾ fl. oz.; magnesium carbonate, 1 oz. Put the $MgCO_3$, alcohol and creosote together in a mortar, add the glycerin and water. Transfer to a bottle, set aside for several days, then filter. The product contains about 10 per cent. by weight of creosote, and may be used for other creosote preparations.

Creosote Pills. J. Schirmer. (*Pharm. Zeit.*, **52**, 169.) The following mass is quickly prepared and gives satisfactory pills:—Creosote, 10 Gm.; glycerin, 1 Gm.; mucilage of acacia, 4; shake well together and mass with licorice root in finest powder, 19 Gm. Divide into 200 pills.

Creosote, Soluble Preparation of. F. H. Bonnefin. (*Lancet*, **1907, 2**, 296.) Concentrated decoction of quillaia (1 in 7), 2; creosote, 1; solution of sodium salicylate (1 in 2), 1. Mix and warm gently.

Dentifrices, Aromatic, causing Eczema. — Galewski. (*Muench. Med. Woch.; Journ. Pharm. Chim.* [6], **24**, 372.) Sixteen cases of labial eczema have been met with, attributed to the

use of mouth-washes or dentifrices powerfully aromatized with essential oils. In most of these oils of peppermint or cloves were present, which are certainly irritant. Tincture of arnica was found in one preparation, a drug which causes great irritation of the epidermis with many individuals. The eczema was found to disappear from several patients when oil of peppermint was omitted from the dentifrice used. Essential oils and terpenes should not be used for mouth washes. Many patients should use only simple unflavoured tooth powders, such as prepared chalk.

Electuarium lenitivum: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 710.) Prune pulp, 4; tamarind pulp, purified, 2; elderberry juice, 2; powdered senna, 1; purified cream of tartar, 1; clarified honey, q.s. to make an electuary. Mix and heat together on the water-bath for 1 hour.

Embalming Fluids. (*Drugg. Circular,* **51,** 268.) Pharmacists abroad are sometimes required to perform the operation of "embalming." The following are three recent formulae for preservative injection fluids for this purpose:—(1) Salicylic acid, 4; boric acid, 5; potassium carbonate, 1; cinnamon oil, 4; clove oil, 3; glycerin, 40; alcohol (denatured), 96; hot water, 96. Dissolve the solids in the water and glycerin, the oils in the alcohol, and mix. (2) Thymol, 1; alcohol, denatured, 16; glycerin, 320; water, 160. (3) Potassium nitrate, 4; potassium carbonate, 4; glycerin, 100.

Emplastrum adhaesivum: Ph. Austr. VIII. (*Pharm. Centralh*, **47,** 710.) Lead plaster, 10; wool fat, 1; yellow wax, 1. Melt together. Meanwhile melt together in another vessel:—Thus, 1; resin, 1; dammar, 1. Mix the two melted liquids, strain, and spread when nearly cold.

Emplastrum adhaesivum: Ph. Danic., 1907. (*Pharm. Zeit.*, **52,** 531.) Rosin, 1; lead plaster, 4. Melt together.

Emplastrum cantharidum c. Euphorbio: Ph. Danic., 1907. (*Pharm. Zeit.*, **52,** 531.) Rosin, 70; suet, 20; yellow beeswax, 40; thus, 25; gum euphorbium in finest powder, 15; cantharides in powder, 30. Melt the resins and wax and add the powders.

Emulsifying Mixture. (*Pharm. Zeit.*, **52,** 202.) The following mixture is an efficient emulsifying agent, resembling "emulgen."

Powdered tragacanth, 8 ; powdered gum acacia, 5 ; alcohol, 10 ; water, 55. (See also *Year-Book*, **1906**, 127.)

Ergot, Preparation of Active Extract of. C. Schnell. (*Journ. Pharm. Chim.* [6], **24**, 70 ; *Pharm. Zeit.*, **51**, 413, 447.) The ergot employed should be that of rye and not of other cereals ; it should be formed on the actual growing crop, and not have made its appearance after reaping. It should be dried in the sun or in a stove at a temperature not exceeding 20 to 25°C., and should then be stored in well-stoppered bottles, a few drops of chloroform being added as a preservative against mites. The extract should be made in winter, since the drug, when moistened, readily decomposes in hot weather.

Two hundred and fifty Gms, of the coarsely powdered drug is treated in a mortar with sufficient distilled water to give a soft paste, which is allowed to stand for 24 hours at a temperature not exceeding 20–25°C. It is then transferred to a percolator and slowly extracted with water, so that the process requires 2 or 3 days. The percolate, as it passes, is evaporated on the water-bath, and when the drug is exhausted the evaporation is continued to give a residue of 125 Gm. The amount of dry extract is then determined in 10 Gm. of this, and by inference the quantity of water. This dry residue is redissolved in 10 c.c. of water and returned to the bulk. To this a weight of alcohol, 80 per cent., is gradually added, equal to the weight of water it contains. The mixture is allowed to stand all night, and is filtered in the morning. It is then evaporated to a soft extract and washed twice with boiling absolute alcohol, to remove resin and fatty matter. The alcohol is decanted and the brown insoluble residue forms the extract of ergot required. It is perfectly soluble in water, giving a clear yellow solution, and is suitable for both internal and hypodermic administration.

Eunatrol Pills. (*Pharm. Zeit.*, **52**, 270.) Eunatrol, 225 grs. ; white bole, 30 grs. ; glycerin, 6 drops ; magnesia, 5 grs. Mass, set aside for 5 minutes, then divide into 60 pills.

Euquinine, Dispensing in Mixtures. A. Astruc and S. Cambe. (*Répertoire* [3], **19**, 52.) When euquinine is ordered in a mixture, it should, as a rule, be suspended, and not dissolved by the addition of acid, since in solution it is quite bitter, whereas when undissolved the taste is but slight, and euquinine is pre-

scribed chiefly on account of its freedom from extreme bitterness. Not only so, but by suspending the euquinine with a little mucilage it may be compounded with certain incompatible salts, such as NaI, with which it is often prescribed. If it be dissolved, decomposition and precipitation will occur.

Explosive Mixtures of $KClO_3$. — Nigay. (*Nouveaux Remèdes*, **23**, 117.) The following chemicals are liable under certain conditions to cause explosive mixtures, $KClO_3$, $KMnO_4$, I, Br, CrO_3, HNO_3. Of these $KClO_3$ is the most frequently prescribed. Generally speaking any admixture with organic matter should be avoided. Tooth powders have been prescribed consisting of mixtures of potassium chlorate with charcoal, quinine and oil of peppermint, or with other ingredients such as cream of tartar, sodium salicylate, glycerin, salol and thymol, all of which are dangerous. If it be considered essential that $KClO_3$ should be prescribed with charcoal or similar bodies, the salt should be powdered separately and mixed on a sheet of paper with a feather or similar soft body. In some cases the friction caused by merely opening a cardboard box containing the mixture is sufficient to cause deflagration. $KClO_3$ should obviously never be prescribed with strong mineral acids, nor with hypophosphites, nitrates, or ferrous salts. The following mixture has been known to explode, seriously injuring the pharmacist who was compounding it:—Calcium hypophosphite, 25; potassium chlorate, 40; iron lactate, 3. The incompatibility of $KClO_3$ with KI, resulting in the liberation of I, and the formation of KIO_3, is well known, but the poisonous nature of the decomposition products may be insisted on. Melseus has found that a mixture of 7 to 10 grs. of a mixture of KI and $KClO_3$ is sufficient to kill a dog.

"Ferrous Carbonate" Solution, a Substitute for Blaud's Pills. G. A. Kal. (*Pharm. Centralh.*, **48**, 403; *Pharm. Weekblad*, **1907**, 244.) Iron lactate, 25; sodium carbonate, 28; potassium neutral tartrate, 22; citric acid, 1; cinnamon water, 500; distilled water, q.s. to make 1,000. A strong solution of the sodium carbonate and potassium tartrate is made with about 50 c.c. of the water. The iron lactate is added to this and stirred until practically dissolved. The rest of the water is then added, when a precipitate is formed, which slowly disappears again after frequent shaking; when this occurs the citric acid and cinnamon

water are added. In this manner a clear green solution containing 1 per cent. of ferrous carbonate is obtained. It should be stored in small well-corked bottles.

Fluid Extracts, Solid Residue and Ash of. — Buttin. (*Schweiz. Woch. Chem. Pharm.*, **44,** 848.) The fluid extracts named give the following mean percentages of solid residue, dried to 105°C., and of ash :—Aconite, 33·89 and 1·02 ; belladonna, 31·66 and 1·73 ; cinchona, 50·27 and 0·47 ; coca, 35·23 and 2·35 ; colchicum, 19·98 and 1·42 ; condurango, 33·9 and 1·95 ; hemlock, 27·75 and 1·33 ; lily of the valley, 37·44 and 2·46 ; digitalis, 57·50 and 3·58 ; eucalpytus, 21·81 and 0·20 ; gentian, 50·59 and 0 38 ; hydrastis, 24·09 and 0·88 ; henbane, 42·97 and 3·17 ; ipecacuanha, 17·75 and 0·20 ; kola, 12·64 and 1 12 ; cascara, 41·23 and 1·82 ; ergot, 16·42 and 2·56 ; senega, 39·83 and 0·91 ; stramonium, 17·29 and 0·54 ; viburnum, 17·20 and 1·01.

Formulae selected from the Formulary of the Victoria Infirmary, Newcastle-on-Tyne. S. Dunstan. (*Chem. and Drugg.*, **70,** 496.) *Linctus camphorae compositus.*—Compound tincture of camphor, 20 ♏ ; syrup of squill, 20 ♏ ; syrup of tolu, 20 ♏. Mix. *Dose*—1 fl. drm.

Linctus mentholis.—Aq. laurocerasi, 10 ♏ ; glycerin, 7½ ♏ ; syr. rhoedas, 15 ♏ ; sp. vin. rect., 12½ ♏ ; menthol, $\frac{1}{10}$ gr. ; aquae ad, 1 drm. *Dose*—1 fl. drm.

Linimentum terebinthinae compositum.—Soft soap, 16 grs. ; strong solution of ammonia, 60 ♏ ; acetic acid, 36 ♏ ; turpentine, 48 ♏ ; water to 1 fl. oz. M.s.a.

Lotio calaminae.—Calamine, 20 grs. ; zinc oxide, 20 grs. ; glycerin, 15 ♏ ; lime-water to 1 fl. oz. Mix.

Mistura ammoniae et ipecacuanhae infantilis.—Ammonium carbonate, 1 gr. ; ipecacuanha wine, 2½ ♏ ; glycerin, 10 ♏ ; water to 1 fl. oz. Mix. *Dose*—1 fl. drm.

Mistura cascarae sagradae.—Liquid extract of cascara, 30 ♏ ; glycerin, 10 ♏ ; aromatic spirit of ammonia, 5 ♏ ; syrup of ginger, 30 ♏ ; liquid extract of liquorice, 30 ♏ ; chloroform-water to 1 fl. oz. Mix.

Mistura mucilaginis composita.—Potassium nitrate, 5 grs. ; liquid extract of liquorice, 5 ♏ ; wine of ipecacuanha, 10 ♏ ; compound tincture of camphor, 30 ♏ ; mucilage of tragacanth, 1 dr. ; water to 1 fl. oz. Mix.

Pulvis alkalinus compositus.—Powdered sugar, 2½ oz.; chlorate of potash, 1¼ oz.; borax, 1¼ oz.; bicarbonate of soda, 1¼ oz.; oil of wintergreen, 1 ♏; thymol, 1 gr. Mix. One teaspoonful in a pint of warm water for syringing the nostrils.

Pulvis alterativus.—Mercury with chalk, 1 part; ginger in powder, 1 part; rhubarb in powder, 2 parts; bicarbonate of soda, 2 parts. Mix. *Dose*—2 to 5 grs.

Gentian, Liquid Extract of. G. M. Beringer. (*Proc. New Jersey Pharm. Assoc.; Proc. Amer. Pharm. Assoc.*, **1906,** 629.) Gentian root in coarse powder, 1,000; water, alcohol 90 per cent. of each, q.s. to make 1,000. Heat water to 60°C. and moisten the drug with it. Set aside for 2 hours and press. Reserve the expressed liquid measuring about 250, add to it alcohol 90 per cent. 250, and set aside. Mix the expressed marc with water at 60°C. 2,000, and when cold again press. Repeat this process with the marc twice more. Evaporate the bulked expressed liquid to a soft extract, dissolve it in the reserved portion, and set aside for 2 or 3 days. Filter and wash the filter with sufficient dilute alcohol (48·6 per cent.) to make the final volume 1,000.

Glycerin as a Solvent. A. M. Ossendowski. (*Pharm. Zeit.*, **52,** 169, after *Journ. Russ. Phys. Chem.*) One hundred parts by weight of glycerin, sp. gr. 1·2,561 at 15°C. dissolves the following quantities of the substances named, at 15°C. to 15·6°C.: —Ammonium carbonate, 20·00; ammonium chloride, 20·06; barium chloride, 9·73; borax, 60·00; boric acid, 11·00; benzoic acid, 10·21; iodine, 2·00; potassium arsenate, 50·13; potassium iodide, 39·72; potassium cyanide, 31·84; potassium chloride, 3·72; potassium chlorate, 3·54; anhydrous potassium gold chloride, 0·68; the same, hydrated, 0·21; sodium carbonate, 98·30; sodium arsenite, 50·00; sodium bicarbonate, 8·06; calcium sulphide, 5·17; copper carbonate, 10·00; copper sulphate, 30·30; tannin, 48·83; mercuric chloride, 8·00; zinc chloride, 49·87; zinc iodide, 39·78; zinc sulphate, 35·18; sulphur, 0·14; phosphorus, 0·25; oxalic acid, 15·10; quinine, 0·47.

Glycerophosphates, combined with Tinctures of Kola and of Coca, Compounding of. A. Astruc and J. Cambe. (*Répertoire* [3], **19,** 112.) The following mixture, which pre-

sents several incompatibilities, has given rise to trouble:—Glycerophosphate of soda, 1; glycerophosphate of lime, 1; tincture of kola, 1; tincture of coca, 1; syrup of bitter orange peel, 50. A clear presentable mixture may be obtained by mixing the tinctures with the syrup and adding sodium glycerophosphate and acid calcium glycerophosphate to the mixture.

Glycerophosphate of Lime Granules, Fictitious. R. Guyot. (*Répertoire* [3], **18**, 300.) Glycerophosphates being somewhat costly, they have tempted substitution, so that "granules of calcium glycerophosphate" without the active ingredient have been met with; these were perfectly soluble in water and left no ash of calcium phosphate on incineration. Pharmacists are recommended to make their granules of glycerophosphate by massing the salt and sugar with alcohol or water, partially drying, granulating through a sieve and completely drying.

Granula dioscoridis: Ph. Danic., 1907. (*Pharm. Zeit.*, **52**, 531.) Arsenious acid, 1 Gm.; powdered acacia, 2 Gm.; powdered milk sugar, 37 Gm.; syrup sufficient to mass. Divide into 1,000 granules.

Granular Effervescent Preparations. G. Lunan. (*Pharm. Journ.* [4], **23**, 665.) The investigation of the subject was undertaken at the request of the Pharmacopoeia Committee of the General Medical Council.

General Process of Preparation: Effervescent Granules.—Mix the sodium bicarbonate, the sugar or gluside, and the medicament when present, pass them through a No. 20 to No. 30 incorrodible sieve. Subject the acids, previously mixed, to the same process, and thoroughly mix the two sifted powders. Place the mixed powders in layers on a suitable dish, pan or glass tray, heated to between 75°C. to 85°C. if required, but not to exceed the latter temperature. When the mass by means of proper manipulation has assumed a uniformly plastic condition, rub it through a No. 5 to No. 10 incorrodible sieve according to the size of granule desired. Dry the granules at a temperature not exceeding 50°C. The products should weigh 100 oz.

Effervescent Granule Basis.—Sodium bicarbonate, in dry powder, 55 oz; tartaric acid, in dry powder, 26½ oz.; citric acid, in powder from uneffloresced crystals, 21 oz. Prepare as above. The product should weigh about 95 oz.

This is intended as a basis for any medicament, particularly those required without sugar. The 5 per cent. shortage is meant for an average medicament, 3 grs. in 1 drm. or 5 per cent. The reaction of the decomposition should be neutral. It could be rendered alkaline by the addition of more sodium bicarbonate. Where a sweetened and slightly acidulated basis is required the effervescent granules of sodium citro-tartrate could be used.

Effervescent Granules of Caffeine Citrate.—Sodium bicarbonate, in dry powder, 50 oz.; tartaric acid, in dry powder, 26 oz.; citric acid, in powder from uneffloresced crystals, 18 oz.; refined sugar, in dry powder, 12 oz.; caffeine citrate, in dry powder, 5 oz. Prepare as above. *Dose*—60 to 120 grs.

Effervescent Granules of Iron and Ammonium Citrate.—Sodium bicarbonate, in dry powder, 50 oz.; tartaric acid, in dry powder, 26 oz.; citric acid, in powder from uneffloresced crystals, 18 oz.; iron and ammonium citrate, in dry powder, 10 oz. Prepare as above. *Dose*—60 to 120 grs.

Effervescent Granules of Lithium Citrate.—Sodium bicarbonate, in dry powder, 53 oz.; tartaric acid, in dry powder, 30 oz.; citric acid, in powder from uneffloresced crystals, 20½ oz.; lithium carbonate, in dry powder, 5 oz. Prepare as above. *Dose*—30 to 60 grs.

Effervescent Granules of Magnesium Sulphate.—Sodium bicarbonate, in dry powder, 37 oz.; tartaric acid, in dry powder, 19 oz.; citric acid, in powder from uneffloresced crystals, 13½ oz.; soluble gluside, in dry powder, ⅛ oz.; desiccated magnesium sulphate, (powdered and dried at a temperature not exceeding 100°C., until it loses 20 per cent. of weight) 40 oz. Prepare as above. The finished product will contain the equivalent of 50 per cent. $MgSO_4 7H_2O$. *Dose*—Repeated, 60 to 120 grs.; single, ½ to 1 oz., best administered in warm water.

Effervescent Granules of Potassium Citrate.—Sodium bicarbonate, in dry powder, 50 oz.; tartaric acid, in dry powder, 25 oz.; citric acid, in powder from uneffloresced crystals, 18 oz.; potassium citrate, in dry powder, 20 oz. Prepare. *Dose*—60 to 120 grs.

Effervescent Granules of Sodium Citrotartrate.—Sodium bicarbonate, in dry powder, 50 oz.; tartaric acid, in dry powder, 26 oz.; citric acid, in powder from uneffloresced crystals, 18 oz.; refined sugar, in dry powder, 15 oz. Prepare as above. *Dose*—60 to 120 grs.

This preparation makes a so-called citrate of magnesia with a

much less percentage of sugar than that ordinarily sent out as such.

Effervescent Granules of Sodium Phosphate.—Sodium bicarbonate, in dry powder, 50 oz.; tartaric acid, in dry powder, 25 oz.; citric acid, in powder from uneffloresced crystals, 20 oz.; desiccated sodium phosphate (sodium phosphate powdered and dried at 100 to 120°C., until it loses half its weight), 25 oz. Prepare as above. *Dose*—Repeated, 60 to 120 grs.; single, ¼ to ½ oz., preferably in warm water.

Effervescent Granules of Sodium Sulphate.—Sodium bicarbonate, in dry powder, 50 oz.; tartaric acid, in dry powder, 23 oz.; citric acid, in powder from uneffloresced crystals, 20 oz.; desiccated sodium sulphate (sodium sulphate deprived of half its weight at 100°C.), 25 oz. Prepare as above. *Dose*—60 to 120 grs. repeated; ¼ to ½ oz. single, preferably in half a tumbler of hot water.

Effervescent Sodium Tartro-Sulphate.—Sodium bicarbonate, in dry powder, 41 oz.; tartaric acid, in dry powder, 37 oz.; soluble gluside, in dry powder, ⅛ oz.; exsiccated sodium sulphate (deprived of all its water of crystallization, 56 per cent.), 22 oz. Mix the dry powders, expose them for an hour to a temperature of 50°C., and pass them through a No. 30 incorrodible sieve. The product should weigh about 100 oz., and contain 50 per cent. of sodium sulphate. *Dose*—Repeated, 60 to 120 grs.; single, ¼ to ½ oz., preferably administered in warm water.

Granular Effervescent Preparations, Method of Preparing. J. P. Remington. (*Amer. Journ. Pharm.*, **78**, 377.) The following process was communicated to the Pennsylvania Pharm. Assoc.:—A sieve of No. 6 mesh galvanized wire is mounted on a frame in such a way as to permit a solid bottom to be inserted. An ordinary rolling pin completes the apparatus. After preparing the mixture it is spread uniformly on the sieve while the bottom is in place. The sieve is then placed in a hot closet, or oven, at the proper temperature, and when the mass has begun to soften the solid bottom is removed, and the frame is placed over a receiving box. The rolling pin is then passed over the mass, and thus forces the salt through the sieve in such a way as to cut it into uniform particles.

Grey Oil for Injection. C. Pepin. (*Journ. Pharm. Chim.* [6], **25**, 283.) As a vehicle, vaseline and liquid paraffin are

recommended, previously melted together to give a basis with the requisite consistence to prevent the separation of the mercury, yet easily rendered fluid for use. Since vaselines vary in consistence, no definite quantities can be given. In France but little uniformity is observed with reference to the mercurial dosage of grey oil : some prescribers require the strength to be in percentage by weight ; others express the weight of the mercury suspended in the volume of the vehicle. Consequently preparations are met with containing 30 to 40 per cent. by weight of Hg, and others containing from 0 08 to 0 20 Gm. of Hg per c.c. Seeing that the injection is always administered by means of a graduated syringe, the latter method of dosage would seem preferable, and should be universally adopted. The mercurial strength should be universally 0 20 Gm. per c.c., since with this strength the ordinary injection syringe, if correctly graduated, may be used. It is known that the maximum dose of Hg for one injection should not exceed 0·14 Gm. This weight would be represented by less than 0 75 c.c. of the above grey oil.

Guttae roseae : Ph. Danic., 1907. (*Pharm. Zeit.*, **52,** 331.) Morphine hydrochloride, 2 ; tincture of cochineal, 10 ; distilled water, 88.

Ichthyol Ointment, Compound, for Chilblains. A. Hecht. (*Merck's Jahresberichte*, **20,** 152.) The affected parts should be bathed in hot water for 10 to 15 minutes each day, dried, and when not ulcerated rubbed with a little spirit. Every evening, the chilblains should be well rubbed with the following ointment and left covered with a thin layer of it :—Ichthyol, 1 to 5 ; resorcin, 1 to 3 ; wool fat, 25 ; olive oil, 10 ; distilled water to make 50.

Ichthyol Ointment for Erysipelas. — Hare. (*Merck's Jahresberichte*, **20,** 153.) Ichthyol ointment is the best application for erysipelas. Ichthyol, 15 Gm. ; citronella oil, 20 drops ; vaseline, 30 Gm.

Incompatibility of Tannigen and Bismuth Subnitrate. A. Astruc and J. Cambe. (*Répertoire* [3], **19,** 109.) When bismuth subnitrate and tannigen are mixed a notable amount of free nitric acid is liberated, so that the latter is liable not to be decomposed as intended by the alkaline intestinal juice. Not only so, but the bismuth forms an insoluble basic terminate

with the tannic acid. Consequently bismuth subnitrate should not be prescribed in conjunction with tannigen.

Infusum sennae c. manna : Ph. Austr. VIII. *Pharm. Centralh.*, **47**, 710. Crushed senna, 12; water, 100. Macerate for 12 hours and strain. To the strained liquor add manna, 15; magnesium carbonate, 1. Heat to boiling and filter.

Inhalation for Whooping Cough. — Kranz. (*Bull. gén. de Thérapeut.*, **151**, 507.) Naphthalin, 180; powdered camphor, 20; eucalyptus oil, 3; tar, 3. A tablespoonful is poured on boiling water, of which the patient inhales the vapour in a closed room for 30 to 45 minutes per diem.

Iodo-Arsenical Syrup for Children. — Huchard. (*Formulary of Nouveaux Remèdes* [23], **1906**.) Syrup of balsam of tolu, 1,000; arrhenal, 0·5; calcium iodide, 5. Dissolve. *Dose*—4 teaspoonfuls daily, as a tonic, for debilitated patients. Specially useful after whooping cough.

Ipecacuanha Syrup. L. V. S. Stanilaus. (*Amer. Drugg.; Proc. Amer. Pharm. Assoc.*, **1906**, 661.) Fluid extract of ipecacuanha, 30; alcohol 90 per cent., 45; strong solution of ammonia, 2; simple syrup, 525. Mix, let stand for 24 hours, and filter.

Insect Stings and Bites, Application for. P. R. Joly. (*Journ. Pharm. Chim.* [6], **24**, 192.) Formalin 40 per cent., 15; xylol, 5; acetone, 4; Canada balsam, 1; essential oil, to perfume, q.s. Shake well and apply with the cork to the part bitten.

Kola Nuts, Preservation of. P. Carles. (*Répertoire,* [3], **19**, 193.) Since 1900 the author has recommended the preservation of fresh kola nuts by simply crushing them with an equal weight of lump sugar and storing the paste thus obtained in glass jam jars covered over on top with tinfoil and paper. Except for a slight layer of mould on top the paste thus treated has kept perfectly for 7 years when stored without any precaution on the laboratory shelf. When exposed as it is to the air, it is scarcely darkens in 4 days; but if the sugar be washed away with water, the kola at once assumes its bright red colour, indicating that the oxydase retains its power unimpaired. It is maintained that this method of preservation is preferable to the

more elaborate and troublesome processes of drying at various temperatures, and the costly method suggested of sterilizing the fresh nuts in boiling alcohol, since it is quite as efficient, and has the great advantage of retaining all the constituents in their natural condition. (See also p. 200.)

Laminaria Tents, Increase of Size by Hydration and Sterilization of. — Debuchy. (*Journ. Pharm. Chim.* [6], **24,** 359.) Laminaria is superior to all material for obtaining a gradual and regular dilatation. The author has examined the degree of expansion of various sizes of laminaria tents, on contact with water for 24 hours, and finds that it is very regular for all sizes; the coefficient for augmentation of the diameter being 2·31, or in round numbers, 2·5 that of the dry article. The length of the pieces does not materially increase. Hydration is not quite complete in 24 hours; on leaving the laminaria in contact with water for 3 or 4 days the increase of diameter ranges from 2·7 to 3·1. Laminaria cannot be sterilized by steam under pressure; but it may be perfectly sterilized by dry heat or by immersion in chloroform or acetone or alcohol 90 per cent., and heating under pressure to 133°C. Sterilization in water, followed by dehydration in alcohol, is unsatisfactory. The sterilized stems may be kept immersed in ethereal solution of iodoform.

Lanoline Powder. (*Pharm. Zeit.*, **51,** 999.) Dissolve lanoline in ether and add sufficient magnesium carbonate to produce a stiff mass. Dry this and rub down with any desired quantity of French chalk and starch.

Laxative for Children. — Sevestre. (*Formulary of Nouveaux Remèdes* [23], **1906.**) Boiling water, 200; manna, 30; senna pods, 4; ground roasted coffee, 10. Strain after infusion. Dose, a small cupful in the morning.

Lemon or Orange Syrup, Improved Method of Preparing. — Manseau (*Bull. Pharm. Bord.*, **46,** 200; *Pharm. Journ.* [4], **23,** 461.) Loaf sugar in large lumps, 1,700 Gm.; distilled water, 1,000 Gm.; citric acid, 30 Gm.; one lemon or orange. The sugar should be broken into large lumps, about 4 or 5 to the kilo. A lemon or orange with a good peel is selected, and this is rubbed on the lumps of sugar until the white portion becomes evident. Meanwhile, the citric acid is dissolved in the water; the sugar is

broken up small and added to the acid liquid, which is then heated to boiling and strained, or it may be dissolved in the cold. The flavour of the syrup thus prepared is infinitely superior to that of the official (Codex) method. It keeps well.

Licorice Elixir. — Upmann. (*Pharm. Zeit.*, **52**, 66.) Licorice root, 4, is macerated with water, 20, and solution of ammonia, 1, for 2 days, strained, pressed, and the liquor evaporated on the water-bath to 2. Alcohol 9 per cent., 2, is then added and the mixture, after standing a few days, is filtered. To each 4 parts of filtrate 1 part of *Liquor ammoniae anisatus*, Ph. G. IV., is added. The preparation keeps well, and shows no separation of anethol. [*Liquor ammoniae anisatus*, Ph. G. IV., is thus prepared :—Anethol, 1, is dissolved in alcohol 90 per cent., 24, and solution of ammonia, sp. gr. 0·960, 5, is added. Ed. *Year-Book*.]

Licorice, Liquid Extract of. — G. M. Beringer. (*Proc. New Jersey Pharm. Assoc.*; *Proc. Amer. Pharm. Assoc.*, **1906**, 629.) Licorice root in coarse powder, 1,000; solution of ammonia, 50; alcohol, water, of each q.s. to make 1,000. Mix the ammonia with water, 950; moisten the drug with 700 of the mixture, pack in percolator, add more menstruum to saturate and leave a stratum above. When the liquid begins to drop close the lower orifice and macerate for 48 hours. Then percolate with the rest of the ammonia water, followed by pure water. Reserve the first 500 of percolate; add to it 250 of alcohol 90 per cent., and set aside. Exhaust the drug by further percolation with water; evaporate the second percolate to a soft extract, dissolve this in the reserve and set aside for 2 or 3 days. Then filter and wash the filter with a mixture of alcohol, 1, water 3, to make final volume of filtrate 1,000.

Liniment of Ammonia, Improved Manipulation of. J. Lothian. (*Pharm. Journ.* [4], **24**, 287.) If the solution of ammonia be shaken with the almond and olive oils previously mixed, or first with the olive oil and then the almond oil added, a liniment of a buttery consistence results which can be poured with difficulty. A. J. Ramage finds that if the almond oil and the solution of ammonia be first mixed and the olive oil afterwards added, a much more fluid liniment is obtained.

Liniment of Lead and Calamine, Compounding of. J. Lothian. (*Pharm. Journ.* [4], **24**, 287.) The following

represents a typical dispensing difficulty:—*R Zinci Oxidi Calaminæ*, aa, ℥iss.; *Liq. Plumbi subacetatis*, ʒii.; *Linimenti calcis*, ℥viii. *Fiat linimentum.*

If the mixed powders are triturated in a mortar with the liniment of lime, the procedure usually adopted, the lime water soon separates, and an unsightly mixture is produced. The following *modus operandi* has been found to give the best results:—Triturate the mixed powders in a mortar with the olive oil, and transfer to a *wet*, wide-mouthed bottle, mix the *Liq. Plumbi subacet.*, and the *Liq. calcis*, add all at once, and shake vigorously; a nice, thick cream results. Liniments of the above nature are very frequently ordered, although not as a rule with such a large proportion of powder.

Linimentum ammoniatum: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 711.) Solution of ammonia, 1; sesame oil, 4. Mix with thorough agitation.

Linimentum (Liquor) capsici co.: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 711.) Capsicum fruits in coarse powder, 100; black pepper fruits in coarse powder, 100; soft soap, 25; camphor, 25; alcohol (90 per cent.), 800. Macerate for 8 days, strain, and press; add eugenol, 5; rosemary oil, 5; cassia oil, 1; solution of ammonia, 200. Filter.

Liquid Extracts of Belladonna, Ipecac., and Nux Vomica. U.S.P. W. A. H. Naylor and J. Chappell. (*Pharm. Journ.* [4], **24,** 393.) The method of preparation of these fluid extracts is commented on, and the official directions for their standardization criticized and compared with the other published processes.

Liquid Sabadilla for Killing Pediculi. A. E. Ebert. (*Meyer Bros.' Drugg; Proc. Amer. Pharm. Assoc.*, **1906,** 645.) Sabadilla seeds, 2 oz.; acetic acid, ½ fl. oz.; wood alcohol, 2 fl. oz.; water to make 16 fl. oz. Mix the acetic acid in 14 fl. oz. of water and boil the sabadilla in the mixture for 5 or 10 minutes. When nearly cold add the alcohol, allow to stand, and decant the clear liquid. Apply to the infested parts night and morning.

Liquor ferri hypophosph. fort. F. Goldby and H. Finnemore. (*Pharm. Journ.* [4], **24,** 102.) The following is suggested as an improvement on the B.P.C. formula:—

Solution of ferric sulphate, B.P., 11 drms. 20 ♏; solution of ammonia, 18 drms.; citric acid, 334 grs.; sodium hypophosphite, 421 grs.; distilled water, chloroform-water (1 in 200), of each a sufficient quantity; sodium citrate, 292 grs.

Dilute the solution of ammonia with an equal volume of distilled water, gradually add the solution of ferric sulphate previously diluted with an equal volume of water, wash the precipitated ferric hydroxide with distilled water by decantation till free from sulphates, collect on a calico filter, drain, and transfer the moist precipitate to a porcelain dish. Add the citric acid, and 5 drms. of distilled water, heat over a water-bath, with occasional stirring, until a clear solution results, then add the sodium hypophosphite, and continue the heat over water-bath with stirring for about 1 minute, or till a clear greenish solution is obtained; lastly add the sodium citrate, filter, and pass sufficient chloroform water through the filter to make the volume up to 10 fl. oz.

Liquor ferri subformici. (*Merck's Jahresberichte*, **20**, 9.) The solution of iron subformate has been introduced as a tonic on similar lines to the iron subacetate solution at present in use. It is a dark red-brown liquid containing 3·8 per cent. of iron oxide and 7·7 per cent. of $(HCOO)_4 (OH)_2Fe$.

Liquor pectoralis: Ph. Danic., 1907. (*Pharm. Zeit.*, **52**, 531.) Extract of licorice, 200; fennel water, 600; anise oil, 3; alcohol 90 per cent., 162; solution of ammonia, 35. Mix.

Loss of Strength of Galenical Preparations by Long Storing. R. A. Cripps. (*Pharm. Journ.* [4], **24**, 519.) *Acetum scillae.*—Two samples kept for nearly 3 years and occasionally opened for testing showed only a slight diminution of strength in acetic acid, from 4·08 to 3·99, and from 3·93 to 3·84 per cent.

Liq. Ammon. Fort., in a stoppered bottle, occasionally opened, in the same time fell from 32·84 per cent. NH_3 to 31·51 per cent.

Liq. Ammoniae.—A specimen kept nearly 3 years in a stoppered bottle, occasionally opened, from 10·27 per cent. of NH_3 decreased to 9·74 per cent.; the same in a corked bottle to 9·62 per cent.

Tinct. Quininae Ammon., kept under similar conditions, showed but little difference between that in corked and in stoppered bottles.

Malt Extract Preparations. H. Rodwell. (*Pharm. Journ.* [4], **24**, 452.) *Liquid Malt Extract.*—Extract of malt (sp. gr. 1·375), 68; alcohol 90 per cent., 7; distilled water, sufficient to produce 100. Mix the alcohol with 25 of the water, dilute the extract of malt with the mixture, and add sufficient distilled water to produce 100. Allow the diluted extract to stand until clear, then decant or siphon off the clear liquid from the deposit formed.

Malt and Cascara.—Extract of Cascada sagrada, 1; glycerin, distilled water, of each a sufficient quantity; liquid extract of malt, a sufficient quantity to produce 50. Triturate the extract of cascara with sufficient water containing 25 per cent. of glycerin, until a syrupy liquid is obtained, then mix with the liquid extract of malt to produce 50.

Malt and Haemoglobin.—Haemoglobin, 1; liquid extract of malt, a sufficient quantity to produce 80. Triturate the haemoglobin with a small quantity of the liquid extract till quite smooth, and mix with the remainder.

Malt and Hypophosphites.—Calcium hypophosphite, 5; sodium hypophosphite, 5; hypophosphorous acid (30 per cent.), 1; distilled water, 50; liquid extract of malt, a sufficient quantity to produce 1,000. Dissolve the calcium hypophosphite and hypophosphorous acid in 40 parts of water, and the sodium hypophosphite in the remainder. Mix the two solutions with sufficient of the liquid extract of malt to produce 1,000.

Malt and Hypophosphites with Cod-liver Oil.—Calcium hypophosphite, 5; sodium hypophosphite, 5; hypophosphorous acid (30 per cent.), 1; distilled water, 50; cod-liver oil, 150; extract of malt, a sufficient quantity to produce 1,000. Dissolve the calcium hypophosphite and the hypophosphorous acid in 40 of water, and the sodium hypophosphite in the remainder. Mix the two solutions with about 750 of malt. Stir in the cod-liver oil until thoroughly incorporated, and finally make up to 1,000 with more of the extract of malt.

Malt and Pancreatin.—Pancreatin, 1; distilled water, a sufficient quantity; liquid extract of malt, a sufficient quantity to produce 50. Triturate the pancreatin with sufficient water to form a syrupy liquid, and mix with sufficient of the liquid extract to produce 50°.

NOTE.—The pancreatin and distilled water may be replaced by glycerole of pancreatin, 10.

Malt and Pepsin.—Pepsin, 1; distilled water, a sufficient

quantity; liquid extract of malt, a sufficient quantity to produce 20. Triturate the pepsin with sufficient water to form a syrupy liquid, and mix with sufficient of the liquid extract to produce 100.

NOTE.—The pepsin and distilled water may be replaced by glycerole of pepsin, 50.

Malt and Iron.—Iron and ammonium citrate, 8·5; distilled water, 10; liquid extract of malt, a sufficient quantity to produce 1,000. Dissolve the iron and ammonium citrate in the water, and add to the liquid extract.

Malt and Glycerophosphates.—Potassium glycerophosphate, 1; Sodium glycerophosphate, 1; distilled water, a sufficient quantity; liquid extract of malt, a sufficient quantity to produce 100. Dissolve the glycerophosphates in sufficient distilled water to produce a syrupy liquid, and mix with the extract.

Marcs, Removal of Alcohol from, by Downward Displacement with Water. H. C. T. Gardner. (*Pharm. Journ.* [4], **23,** 662, 695.) The subject is fully treated of in detail, and does not lend itself to brief condensation. The original article should be consulted.

Mastic Chloroform Solution for Attaching Dressings. W. von Oettingen. (*Nouveaux Remèdes*, **22,** 500.) A solution of mastic, 20, in chloroform, 50, with the addition of linseed (or castor) oil, 1, has been found most serviceable on the battlefield for attaching dressings to wounds. The solution may be made roughly by mixing a heaped spoonful of mastic with 3 spoonfuls of chloroform. This solution for first dressing is painted freely round the wound, without any washing or shaving; a freshly opened sterile dressing is then at once applied over the lesion and the dressing is pressed down on the mastic. The solvent quickly evaporates, and the resin attaches the material securely over the wound, keeping it clean for subsequent treatment.

Medicines, Time for Taking. (Formulary of *Nouveaux Remèdes*, **23** [9].) *Alkalies* should be taken before meals. *Iodine* and its preparations should be given fasting since they are the more rapidly absorbed. *Acids* require to be taken between the periods of digestion, when the mucous membrane of the stomach is in the most favourable condition for their diffusion. In cases

of hyper-acidity they should be given before meals. ***Arsenic, zinc, copper***, and other irritant potent drugs should be taken after meals. *Silver nitrate*, when prescribed internally, should be taken before meals. *Other metallic salts*, specially ***mercuric chloride***, when given internally, must be administered when the stomach is at rest. *Phosphates, cod-liver oil*, and *extract of malt* should be taken during or immediately after a meal.

Mercurial Ointment, Ph. Belg. III. (*Apoth. Zeit.*, **22**, 153.) Mercury, 3; anhydrous wool fat, 3; lard, 4. The mercury is "killed" by trituration with the wool fat, the lard is then mixed in.

Mercury and Zinc Cyanide and its Gauze. Lord Lister. (*Brit. Med. Soc.*, **1907** [2414], 795.) The following formula has been furnished by T. Morson & Son for publication, for the production of the author's double mercury zinc cyanide antiseptic:—Potassium cyanide 98 per cent., 46; mercuric cyanide, 88; dissolve in water, 240; zinc sulphate, 102; dissolve in water, 120. When the two solutions have cooled to about 60°F., mix; collect the precipitate and wash until no precipitate occurs with AmHS and dry. The dry powder is then coloured with purified rosaniline in the proportion of 1 part of colour to 256 parts of double cyanide. Gauze is prepared by drawing it in several thicknesses through a 5 per cent. solution of carbolic acid, in which the cyanide is suspended in sufficient quantity to give a deposit equal to about 3 per cent. of the weight of the dried gauze; the liquid must be constantly stirred during the process to prevent subsidence of the antiseptic. Old rags and other absorbent fabrics may be readily charged by dipping several layers in 5 per cent. phenol solution and dusting one surface with excess of the antiseptic. The double cyanide is much more easily diffused in phenol solution than in water. Before use, a portion of the dry gauze should be dipped in 5 per cent. phenol solution and applied over and round the wound, the rest of the dressing being made up of the dried gauze. Mercuric chloride solution should not be used to moisten the gauze, since it forms a compound with the double cyanide which is irritating, and a feeble germicide. The double cyanide powder might be satisfactorily used as a first dressing in military practice, being freely dusted over the wound, then covered over. It may be safely applied in any quantity, as it gives rise to no toxic symptoms. (See also *Year-Books*, **1890**, 28; **1892**, 27.)

Mercury, Oily Injection of, New Formula for. — Lafay. (*Journ. Pharm. Chim.* [6], **25,** 320.) The following formula gives a product which begins to liquefy at 12°C. and is fluid at 15°C. :—Purified mercury, 40; pure anhydrous wool fat, 13·5; oleonaphthine, 46·5.

Methyl and Ethyl Alcohol, Relative Value of, as Extractive Media for Drugs. L. Rosenthaler. (*Suedd. Apoth. Zeit.* **1907** [22]; *Pharm. Zeit.*, **52,** 290.) In many instances methyl alcohol is as effective, if not more so, than ethyl alcohol, as a menstruum for the preparation of solid extracts, not only giving a higher yield, but on account of its lower boiling point being more satisfactory to work with. With some drugs, however, ethyl alcohol gives better results; thus with rhubarb 32 per cent. of solid extract were obtained with it, and 28 per cent. with methyl alcohol; nux vomica gave 9·2 per cent. of extract containing 20·7 per cent. of total alkaloids with the former, and 8·8 per cent. of extract yielding 16 per cent. of alkaloids with the latter. On the other hand, methyl alcohol gave 16 per cent. of resin from jalap root, while ethyl alcohol afforded but 12·8 per cent. With cinchona, the results were practically identical, ethyl alcohol extracting 20·6 per cent. of solids, containing 14·8 per cent. of alkaloids, and methyl alcohol 20·1 per cent. of extract with 14·5 per cent. of alkaloids.

Migrainine; Antipyrinum Coffeino-citricum: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 710.) Antipyrine, 90; caffeine, 9; citric acid, 1, are dissolved in the smallest possible quantity of water, and evaporated to dryness.

Milk of Almonds. P. Caldwell. (*Drugg. Circ.*, **1906,** 241.) Sweet almonds, 10 oz.; white beeswax, 2 oz.; spermaceti, 2 oz.; oil of sweet almonds, 2 oz.; powdered soap, 4 oz.; glycerin, 24 fl. oz.; tragacanth, 1¼ oz.; oil of bitter almonds, ½ drm.; oil of bergamot, 15 ♏; water to make 1 gallon. Mix the tragacanth and glycerin with 16 fl. oz. of water and let stand over night. Blanch the almonds and rub down to an emulsion with half a gallon of water. Dissolve the soap in 16 oz. of water; melt the wax and spermaceti in the almond oil, add to the soap solution and stir briskly. Then add the tragacanth and glycerin and enough water to make half a gallon. When the

mixture is just tepid mix in the almond emulsion, add the perfumes, and strain.

Mistura camphorata: Ph. Danic., 1907. (*Pharm. Zeit.*, **52**, 531.) Camphor, 8; alcohol 90 per cent., 8; mucilage of acacia, 32; syrup of cherries, 120; distilled water, 832.

Morphine, Solubility of, in Water, and Melting Point of. E. J. Guild. (*Pharm. Journ.* [4], **24**, 357.) The solubility of morphine in water at 20°C. found to lie between 1 : 5,110 and 1 : 5,310. It becomes distinctly brown at 235°C., and decomposes between 245 and 250°C., becoming fused and forming a brown tar on the sides of the tube.

Mucilage of Acacia, Sterilization of. — Buehrer. (*Schweiz. Woch.*, 1906, **44**, 543.) Mucilage of acacia should be sterilized, by being heated for 30 minutes in a water-bath, before being used for galenical preparations. The mucilage is rendered turbid by this treatment, but, as it is less viscous, it may be readily filtered, when it remains permanently limpid. After sterilization it is perfectly compatible with many preparations which it would otherwise oxidize; for instance, it may be mixed with orange-flower water in equal volumes and exposed to sunlight without affecting the aroma. Such a mixture with unsterilized mucilage becomes quite odourless in a few hours.

Mutton Suet as a Pill Excipient. — Zaworski. (*Therap. Monats.*, **20**, 11; *Pharm. Centralh.*, **48**, 202.) Hard mutton suet with the m.p. 45°C. forms an excellent excipient for those drugs which are intended to be absorbed in the intestines, and which may irritate the stomach, such as arsenical or mercurial preparations; benzoic, carbolic or salicylic acids; creosote, guaiacol and other drugs. For this purpose mutton suet is preferable to keratin. Each pill should not contain more than 1½ grs. of the suet. A typical prescription is:—Arsenious acid, 1½ grs.; mutton suet, m.p. 45°C., 150 grs.; powdered licorice root, 150 grs. Mass, divide into 100 pills and sprinkle with lycopodium.

Nitro-Cellulose, Soluble, for Collodion. (*Pharm. Zeit.*, **52**, 8.) An acid mixture is made of 48 parts of nitric acid, sp. gr. 1·48, and 43 parts of sulphuric acid, sp. gr. 1·843. This will contain 8·5 per cent. of water; another 7 per cent. should be added to bring the total to 15 to 17 per cent. One part of cotton wool is immersed in 73 parts of this mixture for about 8 hours at 20°C.,

or 2 hours at 40°C., or 20 minutes at 60°C. The temperature and corresponding time of immersion have an important influence on the solubility of the product. The cotton wool employed should be the kind used for medical dressings [not absorbent cotton], which has been previously boiled with 2 per cent. caustic soda solution, then washed and dried. The nitric acid used should not contain more than 1 per cent. of N_2O_4. The nitrocellulose obtained at the higher temperature is entirely soluble.

Novocaine in Oily Vehicles. (*Pharm. Zeit.*, **51,** 831.) Novocaine is often prescribed in oily solutions, specially for applications to the nose and throat. When such is the case, novocaine hydrochloride should not be used, since it is insoluble in oil, but the free base should be employed. This is readily obtained as a 1 : 10 solution in sweet almond or olive oil by gently heating together on the water-bath. Care should be taken that the oil used be perfectly dry.

Novocaine, Pharmacy of. P. Lemaire. (*Répertoire* [3], **18,** 435.) Novocaine does not form a precipitate with several bodies that throw down with other anaesthetics.

Eye drops.—Borax, 2; novocaine, 1; distilled water, 100.

Subconjunctival injection.—Potassium iodide, 5; novocaine, 2·5; distilled water, 100. Cocaine hydrochloride alypine and stovaine are incompatible with both borax and KI. With novocaine the above solutions are quite bright. Similarly novocaine gives no precipitate with Fowler's solution, so that they may be prescribed together, nor does it throw down with sodium cacodylate. On the other hand, it cannot be compounded in conjunction with arrhenal, with which it gives a precipitate.

Official Formulae of the Addendum of the Ph. Austr. VIII., Selections from. (*Pharm. Centralh.*, **47,** 713.) *Lanolimentum leniens.*—Wool fat, 2; yellow vaseline, 2; orange-flower water, 1; rose water, 1; perfume, q.s.

Mel rosatum.—Tannin, 1 Gm.; dissolved in clarified honey, 999 Gm.; otto of rose, 2 drops.

Pastilli tamarindorum co.—Purified tamarind pulp, 10; senna, in finest powder, 3; powdered white sugar, 5; wheat starch, 1. Mix and heat together on the water-bath, with stirring until a homogeneous mass is formed. Divide into pastilles weighing about 40 grs. each, and cover with chocolate.

Pilulae odontalgicae.—Menthol, 2 Gm.; pyrethrum root, in

finest powder, 2 Gm.; resin of guaiacum, 2 Gm.; yellow beeswax, melted, 4 Gm.; clove oil, 10 drops; cajaput oil, 10 drops. Mass and divide into ½-gr. pills, dust with powdered cloves.

Pulvis adspersorius c. bismuth. subgall.—Bismuth subgallate, 1; powdered French chalk, 4.

Pulvis adspersorius salicylatus.—Salicylic acid, 1; orris-root, in finest powder, 5; zinc oxide, 10; wheat starch, 14; powdered French chalk, 20.

Pulvis digestivus.—Artificial Carlsbad salt, 1; sodium bicarbonate, 3; sugar triturate of peppermint, 1.

* *Pulvis guaranae co.*—Powdered guarana, 5; sodium salicylate, 3; quinine sulphate, 2. To be put up in capsules each containing 15½ grs.

Species carminativae.—Chamomile flowers, 1; fennel fruits, 1; althaea root, 2; couch-grass rhizome, 2; liquorice root, 2. Mix.

Species puerperales.—Verbascum flowers, 1; melon seeds, 1; couch-grass rhizome, 2; liquorice root, 2; althaea species, 4.

Species altheae.—Althaea leaves, 11; althaea root, 5; liquorice root, 3; marshmallow flowers, 1.

Species stomachicae.—Cinnamon bark, 1; peppermint leaves, 1; *Centaurea minus* herb, 2.

Syrupus coccionellae.—Powdered cochineal, 100; pure potassium carbonate, 10; rose water, 1,500; cinnamon water, 1,500. Digest together for 4 hours, filter, and dissolve in the filtrate, by boiling; white sugar, 1,660; alum, 1.

Syrupus guaiacoli co.—Potassium guaiacolate, 1; dissolve in water, 4, and add syrup of orange peel, 10.

Syrupus pectoralis.—Dilute cherry-laurel water (1 : 19), 1; mucilage of acacia, 4; syrup of cochineal, 4; syrup of senega, 4; syrup of orange flowers, 7.

Syrupus thymi co.—Liquid extract of thyme, 1; clarified honey, 2; simple syrup, 7.

Tabulae glycyrrhizae c. ammon. chlor.—Gum acacia, sugar, purified liquorice juice, of each, 5, are dissolved in water and evaporated to a thick paste. Ammonium chloride, 1, is then mixed in, and the mass divided into suitable tablets, which are dried and dusted over with sugar triturate of anise oil.

Tinctura cajuputi co.—Anethol, 4; cajaput oil, 4; juniper oil, 4; Haller's acid solution, 1; spirit of ether, 17; tincture of cinnamon, 20.

Tinctura gingivalis.—Star-anise fruits, cloves, cinnamon bark,

rhatany root, of each, 25 ; cochineal, guaiacum resin, of each, 10 ; alcohol (90 per cent.), 1,000. Digest for 8 days, strain, press and filter. Then dissolve in the filtrate thymol, 1 ; chloroform, 5 ; anethol, 2 ; peppermint oil, 10.

Tinctura odontalgica.—Menthol, 1 ; eugenol, 1 ; chloroform, 4 ; ether, 4 ; tincture of guaiacum, 10.

Tinctura stomachica.—Bitter orange peel, 20 ; cinnamon bark, 4 ; white Malaga wine, 100. Macerate 8 days, strain and press. Then add extract of *Centauria minor*, 2 ; extract of gentian, 2 ; extract of *Trifolium fibrinum*, 2. Allow to stand for 8 days, then filter.

Unguentum ad perniones.—Wool fat, 12 ; camphorated oil, 2 ; Peruvian balsam, 3 ; tincture of opium with saffron, 1 ; lead subacetate solution, 1 ; white petroleum oil, 1. Mix.

Tinctura rusci aetherea.—Lavender oil, 1 ; rosemary oil, 1 ; oil of birch, empyreumatic, 26 ; ether, 36 ; alcohol (90 per cent.), 36. Mix.

Traumaticinum.—Purified white gutta-percha, 1 ; chloroform, 8 ; dried sodium sulphate, 1. Macerate together until the gutta-percha is dissolved, then filter through cotton wool.

Ointment of Collargol with Alcohol. — Ganz. (*Nouveaux Remèdes*, **22,** 505.) An ointment containing 1 in 200 of collargol and 140 in 200 of alcohol 96 per cent., with sufficient hard soap, wax, and glycerin to give the ointment the consistence of butter, is very serviceable for general antiseptic use. Its application provokes cutaneous hyperaemia, which assists the action of the collargol. It hastens the healing of wounds without causing irritation ; good results have been obtained with wounds, bruises, chilblains, skin diseases, suppurating ulcers, and other lesions. The ointment is supplied in a thin layer, and the part immediately covered with an impermeable dressing.

"Ointment of Three Acids" for Pruritus. — Brocq. (*Medicino Mod.*, through *Nat. Drugg.*, **37,** 91.) Phenol, 1 ; salicylic acid, 2 ; tartaric acid, 3 ; glycerol of starch, 60 to 100. Mix. For external use.

Ointment of Yellow Mercuric Oxide. W. Harrison Martindale. (*Ophthalmoscope ; Lancet*, **1906,** 2, 1459.) Mercuric chloride, 20, is dissolved in sufficient distilled water to give a dilute solution. This is precipitated with a dilute solution

of NaOH. The precipitate (equivalent to 16 of dry HgO) is thoroughly washed, drained on a fluff-free linen filter, and mixed while moist with sufficient soft paraffin to give 160 parts by weight of 10 per cent. ointment. The product may be kept under water or in collapsible tubes. The stronger ointment may be diluted as required. The author has also obtained good results with the new U.S.P. method, which directs the HgO to be triturated with an equal weight of water until perfectly smooth; 4 parts of hydrous wool fat are then added in portions; finally 4 parts of soft paraffin are incorporated.

Ointments in Dermatology, and Preparation of Lard therefor. P. Carles. (*Répertoire* [3], **18**, 289.) The author reproduces the chief points of pharmaceutical interest from a *résumé* of a course of lectures by the dermatologist Dubreuilh. Among ointment bases lard takes the first rank; it is rapidly absorbed by the skin. Its great fault is the tendency to become rancid, when it is irritating to the skin. Otherwise it is an ideal basis, causing the drugs it carries to be rapidly absorbed.

Vaseline has the advantage that it does not become rancid, but it is not absorbed by the skin. It forms a layer which prevents evaporation; its application sometimes causes a regular maceration of the surface it covers. Lanoline is the basis to be employed when it is wished to apply an aqueous solution in the form of ointment, but its powers of penetrating the epidermis have yet to be proved.

Commercial lard is rarely sufficiently pure for pharmaceutical use, nor are the official directions for its purification sufficient. The melted fat should be washed several times with boiling distilled water, then slowly cooled so that all impurity may be precipitated. The process is repeated if necessary; when no grey particles are seen and the separated water is quite clear, the fat is remelted and cooled to ensure the separation of water. Finally it is again melted and filtered through paper, in a hot-water funnel. In this manner a product is obtained so pure and dry that it will keep for several years without oxidizing or acquiring the least rancid colour. Other animal fats should be treated in a similar manner.

Ointments, Microscopical Examination of. L. Kauffeisen. (*Répertoire* [3], **18**, 344.) Microscopical examination is a useful guide to the degree of comminution of active ingredients, and

sometimes indicates a more effective method of manipulation than that generally followed. Of the four bases most commonly used, vaseline, lard, cerate and lanoline, *vaseline* is easily recognized microscopically by its showing when melted and recongealed on the slide, irregular, needle-like striae. *Simple cerate,* when fresh, shows a number of minute globules of water, on a white field, almost all of the same diameter ; when the cerate is old, the field is granular and shows large drops of liquid. *Lanoline* shows a white field with a dusty appearance ; with *benzoated lard* the appearance is somewhat sandy or granitic and striated. (The "Codex" lard is aromatized with tincture of benzoin.)

When soluble salts are to be incorporated into an ointment the solution employed should always be made without heat and not too strong, or crystallization will soon occur, rendering the ointment less active and gritty. Old ointments often show crystals which were not evident in the fresh preparation : these have resulted from the evaporation of water. The addition of lanoline renders it easy to incorporate more water, and sometimes a very little tragacanth may be used for the same purpose.

With *potassium iodide ointment* freshly made only the lard basis is seen, but when old, very distinct crystals of KI are evident. Since it takes some time to incorporate the amount of water prescribed in the Codex with the fat, the salt is often dissolved in less water with heat, but this should never be done. A 5 per cent. *ointment of menthol* with vaseline basis is shown to be satisfactorily prepared by rubbing down the menthol first, then adding the vaseline. *Salol ointment* 5 per cent. is satisfactory with a vaseline basis if the vaseline is first melted and added to the salol, rubbed down with a little vaseline oil. *Iodoform ointment* with vaseline base is best made by thorough trituration with vaseline oil, then mixing in the rest of the vaseline. Solution of the iodoform in ether gives bad results ; dissolving the iodoform with heat in the vaseline, and removing any iodine liberated by means of a few drops of thiosulphate, gives good results when the amount of iodoform present does not exceed what the vaseline will dissolve, but this is not often the case. *Cocaine ointment* is satisfactorily made with vaseline by dissolving cocaine alkaloid in the vaseline with heat on the water-bath until solution is complete. This is preferable to dissolving the hydrochloride in water or rubbing down the crystals of the salt with the base. *Mercuric chloride* should not be rubbed down with

vaseline in preparing an ointment, for crystals of sufficient size to cause great irritation may easily be left. The salt should be dissolved in 20 times its weight of water, enough lanoline added to absorb the liquid and the weight made up with vaseline. *Boric acid ointment*, 10 per cent., invariably shows large crystals under the microscope; this is unavoidable, and the only precaution that can be taken is to employ the finest commercial powder. *Zinc oxide ointment* shows only a very fine powder when made with vaseline as it should be, for its object is to form a superficial layer on the skin. (The use of benzoated lard for this ointment is not considered.) *Precipitated sulphur ointment 5 per cent.*, prepared by triturating the sulphur with a little vaseline oil, then adding vaseline, shows particles of sulphur of all sizes. This proves that prescribing precipitated instead of washed sulphur does not ensure a finer state of division. A well-made ointment can be obtained only by prolonged trituration. *Red mercuric oxide ointment* can only be made free from crystals of considerable size by a process of prolonged porphyrization; the product is a reddish-brown ointment which still contains some angular crystals. *Yellow mercuric oxide ointment* is best prepared with the freshly precipitated pulpy oxide, thoroughly washed and drained on a filter. The amount of water is determined in this, the requisite quantity weighed off and mixed with the vaseline, or preferably a mixture of vaseline and lanoline, and heated to 110°C. with constant stirring until all the water is evaporated. The ointment is cooled and run when tepid into pots, which are immediately closed. Thus prepared the ointment has the microscopic appearance of a perfect preparation. It keeps well. *Mercuric nitrate ointment*, when freshly prepared, resembles lard in the microscopical appearance. Old specimens show globules of metallic mercury. *Sulphur ointment* is one of the least satisfactory, for its microscopical examination shows masses and crystals of sulphur of varying sizes. In making *collargol ointment* the collargol is to be rubbed down as finely as possible with a little water, and added to a mixture of equal parts of lanoline and vaseline; the ointment produced is not perfect, so special care should be directed to the rubbing down of the collargol. *Calomel ointment* usually shows marked crystals; the active ingredient should at least be porphyrized. *Mercurial ointment*, although it may reveal no granules under a pocket lens, will show large globules under the microscope. Care should therefore be taken that the mercury

is thoroughly killed before adding it to the lard. This is best done by rubbing it with lanoline ; 50 Gm. of mercury are rubbed with 10 Gm. of lanoline for about an hour until globules are no longer visible under the microscope larger than small grains ; the product is then triturated with the lard. Drawings are given of the microscopical appearance of 21 various ointments and bases.

Oxymel scillae : Ph. Austr. VIII. (*Pharm. Centralh.*, **47**, 711.) Extract of squill, 1 ; acetic acid, 1 ; dissolve and add clarified honey, 98.

Parenols—New Ointment Bases and Paraffin Cold Creams. John Humphrey. (*Pharm. Journ.* [4], **23**, 623.) The following formulae are found to yield satisfactory products, the first being somewhat better than the second and third :—

Wool Fat Parenol.—Soft paraffin, 65 ; wool fat, 15 ; distilled water, sufficient to produce 100. Warm the water and mix gradually with the melted soft paraffin and wool fat, in a warm mortar.

Beeswax Parenol.—Soft paraffin, 70 ; white beeswax, 5 ; distilled water, sufficient to produce 100. Proceed as in the former case.

Spermaceti Parenol.—Soft paraffin, 70 ; spermaceti, 5 ; distilled water, sufficient to produce 100. Proceed as in the first case.

These solid parenols are of ointment-like consistence, can be made to take up more than their own weight of water, mix with all fats, and can be used alone or in combination with other substances.

Liquid Parenol.—Liquid paraffin, 70 ; white beeswax, 5 ; distilled water, sufficient to produce 100. Proceed as in the case of wool fat parenol.

The liquid parenol is a neutral liniment, possessing similar properties to the solid preparations, and can be used in the treatment of skin diseases, for lubricating catheters, or as a vehicle for injections.

Paraffin Cold Cream.—Soft paraffin, 20 ; white beeswax, 20 ; almond oil, by weight, 80 ; borax, 1 ; oil of rose, a sufficient quantity ; rose water, 40. Melt the wax in the oil, and dissolve the borax in the rose water by the aid of heat. Add the aqueous solution gradually to the wax and oil, stir continually till the

mixture is almost set, then add the soft paraffin, mix, add the perfume, and again stir till a homogeneous mixture results.

The following modification of this formula for cold cream is now recommended as yielding a beautfully white and homogeneous preparation, which will not become rancid on keeping.

Parenol Cold Cream.—Soft paraffin, white, 12; white beeswax, 12; almond oil, by measure, 50; borax, 1; oil of rose, a sufficient quantity; rose water, 25. Melt the wax in oil and dissolve the borax in the water by the aid of gentle heat. When both solutions are at about the same temperature add the aqueous liquid gradually to the wax and oil, and stir till the mixture stiffens. Pour into a slightly warmed mortar containing the soft paraffin, stirring until mixed, then add the perfume and again stir till cold.

This preparation is intended for toilet purposes. If required as a basis for medicaments, such as are sometimes ordered with cold cream, the borax should be omitted.

Parenol Ointment Basis, Ointments made with. A. McMillan. *Pharm. Journ.* [4], **24,** 5.) *Unguentum conii* was prepared according to the following formula:—*Succus conii*, 160, evaporated at a low temperature to 20; *Adeps lanae*, 15; *paraffin. mollis*, 65. This has been kept for over a month, and shows no sign of separation or moulding; nor does it darken on the surface, as is the case with the B.P. preparation.

Unguentum acidi carbolici.—Prepared with beeswax parenol is easily made, and is a satisfactory product. Phenol, 5; *paraffin. mollis*, 65; *cera alb.*, 5; *aquae*, 25. Note that this is prepared of 5 per cent. strength, it being considered necessary that it should be this strength owing to the loss of power evidenced in phenol when mixed with fats.

Unguentum Gallae c. opio—*Pulv. gallae*, 20; *ext. opii*, 3·75; *adeps lanae*, 11; *paraffin. mollis*, 50; *aquae*, 15·25. Rub down the extract of opium with the water and add to the other ingredients in a mortar. This ointment, if made in the cold way, is perfectly satisfactory, provided a finely powdered gall powder is used. Its ready absorption is an advantage when used in haemorrhoids.

Pharmacopoeias, Modern, and the International Agreement. H. G. Greenish. (*Pharm. Journ.* [4], **24,** 832.) Details of

preparations in the Spanish, Belgian, Dutch, Austrian, and United States pharmacopoeias, which have been recently published, are given. The following table shows that with the notable exception of the U.S.P. considerable advance has been made in the direction of uniformity in the case of potent medicines.

	Complete Agreement. Per cent.	Approximate Agreement. Per cent.	Want of Agreement.
Spanish	96·50	—	3·50
Belgian	87·50	6·25	6·25
Dutch	81·25	6·25	12·50
Austrian	77·00	11·00	11·00
U.S.	26·66	30·0	43·33

Phenolphthalein Preparations. (*Bull. Pharm.*, **1907,** 177; *Apoth. Zeit.*, **22,** 385. *Phenolphthalein Elixir.*—Phenolphthalein, 7; saccharine, 0·7; Garus's spirit, 500; tincture of saffron, 1; simple syrup to 2,000 fluid parts. A tablespoonful contains about 1½ grs. of phenolphthalein. (Garus's spirit is prepared thus:—Aloes, 5; myrrh, 2; cloves, 5; nutmeg, 10; cinnamon, 20; saffron, 5; macerate for 4 days with alcohol 80 per cent. 5,000; filter; add water, 1,000, then distil off, 4,500.) Any other alcoholic flavour may be substituted for this in the above formula.

Phenolphthalein Black Currant Laxative.—Phenolphthalein, 6; saccharin, 3; alcohol, 90 per cent. 500; syrup of black currant, 300; simple syrup to make 1,200. Two tablespoonfuls for a dose, at bedtime, for an adult; a dessertspoonful for children under 12 years of age.

Phenolphthalein Granules.—Vanillin, 1; alcohol 90 per cent., 100; phenolphthalein, 20; sugar, 1,960; gum acacia in powder, 20; simple syrup, q.s. Granulate in the usual manner. (See *Year-Book*, **1902,** 236.)

Pill of Calomel, Compound, Improved Formula for. Sir James Sawyer. (*Lancet*, December 1, **1906.**) The present official formula, and the original recipe of Plummer, give a pill which disintegrates very slowly, or not at all, so that it has been known to pass whole through the patient's body. It is proposed to substitute syrup of glucose for castor oil in making the mass.

Pulpa Prunorum: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 711.) Prunes are boiled in water and pulped through a coarse sieve; the pulp is evaporated in a porcelain dish to a thick extract. Three parts of the thick pulp is then mixed with 1 part of powdered white sugar and evaporated until it contains not more than 40 per cent. of moisture.

Quinine, Means of Masking the Taste of. — Roch. (*Répertoire* [3], **18,** 356.) The dose of quinine salt is made into one or more boluses with twice its weight of cacao butter. These are placed in a spoonful of hot milk and swallowed.

Rectal Medication by Injections and Washes. (*Rivist. Chim. Farm.*, through *Annales de Pharm.*, **12,** 407.) *Rectal injection of Potassium Iodide.*—Potassium iodide, 1; distilled water, 10. A teaspoonful is mixed with 2 or 3 tablespoonfuls of boiled water, and injected night and morning.

Rectal injection of Potassium Bromide.—Potassium bromide, 2; distilled water, 15. One tablespoonful with 2 or 3 tablespoonfuls of water to be given as above.

Arsenical rectal injection.—Fowler's solution, 1; distilled water, 30. A teaspoonful diluted to be given as above.

Cacodylate rectal injection.—Sodium cacodylate, 1; distilled water, 500. To be administered, diluted, as above.

Quinine rectal injection.—Quinine hydrochloride, 15 grs.; Sydenham's laudanum, 5 drops; distilled water, 2 fl. oz. To be administered by means of a rubber injection syringe.

Rectal wash of Creosote.—Creosote, 1; decoction of quillaia, 9. A tablespoonful is diluted with 4 fl. oz. of water, and 5 drops of laudanum added, to be used at bedtime.

Rectal washes of Hydrogen Peroxide.—Hydrogen peroxide, neutral, and diluted to the strength of 2 to 3 volumes, is used night and morning. The following is also prescribed:—Hydrogen peroxide, 50 to 100; sodium chloride, 5; sodium phosphate, 3; sodium bicarbonate, 0 5. Boiled water to make 1,000. Two or 3 washings a day to be made with 2 to 4 oz. of this.

Rectal wash of Silver Nitrate.—Silver nitrate, 1½ to 3 grs.; distilled water, 2½ fl. oz. To be used night and morning, and retained in the rectum for about 10 minutes each time.

Rhamnus frangula Bark, Liquid Extract of: Ph. Danica, 1907. (*Pharm. Zeit.*, **52,** 531.) *Rhamnus frangula* bark, 100, is ex-

tracted by percolation with water, the first 70 fluid parts of percolate being reserved. The remainder is evaporated to 10, mixed with the reserve, and alcohol 90 per cent. 20, is added to the mixture. *Liquid extracts of cascara* and of *senega* are prepared similarly.

Rhubarb, Wine N.F. P. Cauldwell. (*Drugg. Circ.*; *Proc. Amer. Pharm. Assoc.*, **1906**, 675.) The present N.F. formula is condemned and the following suggested as an improvement :—Liquid extract of rhubarb, 100 ; essential oil of calamus, 10 ; potassium carbonate, 4 ; wine, q.s. to make 1,000. This makes a bright and permanent wine.

Ringer's Hypodermic Solution. (*Drugg. Circ.*, **51**, 216.) Ringer's solution is employed hypodermically at Jacob's Hospital, Leipzic, in cases of severe burns. It is prepared in two strengths, the stronger being most frequently administered. (1) NaCl, 7·5 ; $CaCl_2$, 0·125 ; KCl, 0·075 ; $NaHCO_3$, 0·125 ; distilled water to 1,000 Gm. (2) NaCl, 9·00 ; $CaCl_2$, 0·24 ; KCl, 0·42 ; $NaHCO_3$, 0·30 ; distilled water to 1,000 Gm. Dissolve and sterilize.

Saccharine Matter, Influence of, on the Iodine Reaction. P. Grelot. (*Journ. Pharm. Chim.* [6], **23**, 154.) Saccharose, glucose, lactose and gum acacia solutions all have the property of diminishing the sensibility of the iodine-starch reaction ; in the case of small amounts of iodine even entirely suppressing the same. Various factors influence this result, notably the time of contact of the iodine and carbohydrate solution, and the temperature. In detecting traces of iodine in saccharine or gum solutions the best results are obtained with a 5 in 1,000 solution of starch, one volume of which is carefully run down the sides of a test tube containing 2 volumes of the solution to be tested. A faint blue ring will be evident at the zone of separation. The amount of iodine requisite to give a reaction under these conditions is considerable. Thus with *saccharose* in the proportion 40 Gm. per litre, 3 Mgm. of iodine per litre could be detected ; with 300 Gm., 4 Mgm. ; with 675 Gm., 5 Mgm. ; and with 825 Gm., 5·4 Mgm. With *lactose* in 20 Gm. per litre, 3 Mgm. of iodine were evident ; with 50 Gm., 4 Mgm. ; with 100 Gm., 5 Mgm. With *glucose* 25 Gm. per litre, 8 Mgm. of iodine was detectable ; with 75 Gm., 14 Mgm ; with 100 Gm., 16 Mgm ; with 150 Gm. 20 Mgm. ; with 200 Gm. 25 Mgm. With *gum acacia* 30 Gm.

per litre, 5 Mgm. of iodine in the same volume was shown; with 50 Gm., 6 Mgm.; with 100 Gm. 7 Mgm.; and with 200 Gm. 8 Mgm. It is evident that glucose has a much greater power of dissimulating iodine than the other carbohydrates. [It is noteworthy that commercial glucose frequently contains more than traces of SO_2 employed in the manufacture as a bleach. With such glucose the apparent "dissimulation" of the iodine would naturally be very high.—Ed. *Year Book.*] Temperature has a marked influence in increasing the amount of iodine "dissimulated." The cause of the disappearance of the free iodine is found to be due at first to its conversion into HI, but after a time, this also disappears and a new iodo compound formed, the nature of which has not yet been determined.

Salzburg Aperient Species. (*Pharm. Zeit.*, **52,** 363.) Senna leaves; sodium sulphate, cut taraxacum root, of each, 8; fennel fruits, chamomile flowers, lime tree flowers, of each 2; cut chicory root, cut burdock root, of each 1.

Salicin, Solubility of. D. B. Dott. (*Pharm. Journ.* [4], **24,** 79. The solubility of salicin as given in the British Pharmacopoeia (1 in 28 parts of water) seems to be practically correct. The U.S. Pharmacopœia takes the abnormally high temperature of 25°C. as its standard for solubilities. With reference to salicin, the solubility is given as 1 in 21 of water at that temperature. The solubility of pure salicin, melting at 201·5°C. by two methods, is found to be very nearly 1 in 24 parts of water at 25°C. It was first tried by adding water gradually from a burette to a weighed quantity of salicin in a stoppered bottle, the bottle being well shaken after each addition of water, and the whole being kept as near 25°C. as possible. In the second case, water at 25°C. was saturated by shaking with excess of salicin, a portion filtered, the filtrate weighed, evaporated to dryness, and the salicin weighed.

Salol Coating for Pills. P. W. Byrd. (*South. Drugg.; Proc. Amer. Pharm. Assoc.*, **1906,** 649.) The following method gives a smooth coat which is not brittle:—Salol, 95, and balsam of tolu, 5, are melted together on the water-bath, and the mixture kept liquid with a gentle heat. The pills, fixed on needles, are dipped in the usual manner. When cold the coat is, if necessary, again melted and allowed to cool, to obtain a good gloss.

Santonin Emulsion. J. Ferreira. (*Merck's Jahresberichte*, **20,** 238. Santonin may be prescribed in the form of an emulsion, as follows. Santonin, 10 Cgm.; castor oil, 20 Gm.; anise oil, 10 drops; mucilage of Irish moss, 40 Gm. Dissolve the santonin in the oil and emulsify.

Schleich's Solutions, New Formulae for. (*Pharm. Centralh.*, **48,** 74.) (1) Cocaine, 0·1; alypine, 0·1; sodium chloride, 0·2; distilled water, 100. (2) Cocaine, 0·05; alypine, 0·05; sodium chloride, 0·2; distilled water, 100. (3) Cocaine, 0·01; alypine, 0·01; sodium chloride, 0·2; distilled water, 100.

Sebum salicylatum: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 711.) Prepared tallow, 98; benzoin, 10; digest together in the water-bath for 1 hour, strain, and add salicylic acid, 2.

Sedative Antipruriginous Applications. — Leredde. (*Formulary of Nouveaux Remèdes.*) (1) Lanoline, 90; camphorated oil, 10; chloral hydrate, 1. (2) Zinc oxide, prepared chalk, camphorated oil, lime water, of each equal parts.

Sedative Dermatological Pencils. — Leistikow. (*Formulary of Nouveaux Remèdes.*) Extract of Indian hemp, 2; resin, 1; yellow beeswax, 9; olive oil, 8. Melt together and run into suitable moulds.

Serum lactis: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 710.) Fresh cow's milk, 100; heat to boiling and add vinegar, 1. When curdled, strain, and to the partially cooled liquid add a small quantity of whipped white of egg. Shake and again strain. Finally neutralize the acid with magnesia and filter when cold. When *Serum lactis acidum* is prescribed, the treatment with magnesia is omitted.

Silver Acetate Solution for Ophthalmic Use. (*Nouveaux Remèdes*, **23,** 225.) A 1 per cent. solution of silver acetate is to be preferred to a similar solution of nitrate for ophthalmic use, because the solubility of the acetate being 12 : 100, if any evaporation occurs, the salt is deposited and no marked increase of strength results. This is of some importance where a silver collyrium has sometimes to be left in unskilled hands, as, for instance, in the treatment of the purulent ophthalmia of new-born children. Moreover, when decomposition occurs, the

liberated acetic acid is much less caustic than the nitric acid set free from the nitrate. The acetate solution should be directed to be used by instillation, followed by washing with physiological salt solution.

Skin Pastes and Powders. H. Unna. (*Apoth. Zeit.*, **21,** 527.) *Lepismatic Paste (Scurf Paste).*—Ichthyol, 1 ; vaseline, 1 ; resorcin, 4 ; Unna's zinc paste, 4. *Zinc Paste.*—Kieselguhr, 5 ; zinc oxide, 25 ; benzoated lard, 60 ; benzoated oil, 10. *Sulphurated Zinc Paste.*—Kieselguhr, 2 ; precipitated sulphur, 5 ; zinc oxide, 7 ; benzoated oil, 6 ; benzoated lard, 30. *Camphorated Sulphur Zinc Paste.*—Sulphurated zinc paste, 4 ; camphorated ointment, 4 ; ichthyol, 10 ; finest mustard powder, 10. *Styptic Powder*—Powdered alum, tannic acid, powdered gum acacia, finest powdered resin, equal parts. *Bismuth Oxychloride Ointment.*—Bismuth oxychloride, 1 ; zinc ointment, 9.

Snuff for Acute Coryza. —. Capitan. (*Nouveaux Remèdes Formulary*, **23,** [5], 3.) Salol, 10 ; salicylic acid, 2 ; tannin, 1 ; boric acid, 10. Mix. A little to be snuffed up each nostril every hour for 6 hours. If it be necessary to continue the treatment longer, the quantity of boric acid should be doubled or quadrupled.

Soap as a Pill Excipient. A. Astruc and J. Cambe. (*Répertoire* [3], **19,** 110.) Medicinal or almond oil soap makes an excellent excipient for many complex pills containing drugs and salts, such as the following :—Gum ammoniacum, 1 Gm. ; powdered ipecacuanha, 0·20 Gm. ; morphine acetate, 10 Cgm. ; ammonium carbonate, 1 Gm. Make 20 pills. Mucilage was ordered as the excipient for this, but the mass was not satisfactory. An excellent result was obtained by massing with 1 Gm. of medicinal soap.

Sodium Perborate in Ointment and in Oxygen Baths. Maget. (*Press. Med.* ; *Merck's Jahresberichte*, **20,** 193.) Sodium perborate is recommended for use as being a powerful disinfectant liberating nascent hydrogen peroxide *in situ* when applied to moist surfaces. Consequently in compounding it, the presence of any moisture must be avoided. It is best dispensed in the form of a 10 or 20 per cent. vaseline ointment such as the following :—Sodium perborate in finest powder, 4 ; white vaseline, 20 ; san

dalwood oil, 10 drops. This ointment keeps perfectly and shows little sign of alteration in 3 months. It also has the advantage over perborate ointments prepared with other bases, that it does not occasion irritation.

The perborate is also used to produce the so-called oxygen bath by dissolving the perborate in the bath water at a temperature of 32–34°C., the patient being immersed therein and manganese borate added as a catalyser. The evolution of oxygen ceases in about 15 or 20 minutes when the patient quits the bath. The bath is stated to be useful in nervous affections such as neurasthenia and similar complaints.

Species amarae : Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 710.) Wormwood herb, *Centaurium minor* herb, bitter orange peel, of each, 20 ; *Trifolium fibrinum* leaves, calamus rhizome, gentian root, of each 10 ; cinnamon bark, 5. Coarsely cut, and mix.

Spermaceti Ointment : Ph. Danica., 1907. (*Pharm. Zeit.*, **52,** 531.) White beeswax, 1 ; spermaceti, 2 ; oil of sweet almonds, 12 ; rose water, 5. (Melt the wax and spermaceti in the oil, add the rose water gradually, and stir until cold).

Suppositoria glycerini : Ph. Austr. VIII. (*Pharm Centralh.*, **47,** 710.) Crystalline sodium carbonate, 5 ; stearin, 9, are dissolved on the water-bath in glycerin, 100, and heated until the stearin is saponified. The mass thus formed is moulded into suppositories, as required.

Syrup of Balsam of Tolu, Cause of the Coal Gas-like Odour of. — Oliviero. (*Journ. Pharm. Chim.* [6], **24,** 62.) Certain moulds, such as *Aspergillus niger* and *Penicillium glaucum*, have a marked action on cinnamic acid, quickly decomposing it with the production of cinnamene, a small trace of which is readily detectable by its peculiar odour, resembling that of benzol or of coal gas. The reaction is so sensitive that a solution of cinnamic acid may be used as a reagent to detect the presence of moulds. It is to this that the peculiar gas-like odour sometimes met with in syrup of balsam of Tolu is due. This unpleasant odour is specially likely to develop where tap or well water has been employed in the manufacture of the syrup instead of distilled water, for moulds are found to grow more freely in such water, with a larger proportion of solid residue of inorganic salts. The

decomposition of an aromatic acid by an enzyme, with the liberation of its corresponding carbide, does not appear to have been recorded previously.

Syrup of Balsam of Tolu, Cause of the Colour produced by, with Codeine Syrup, and with KI. A. Astruc and J. Cambe. (*Répertoire* [3], **19,** 112.) With a mixture of syrup of codeine (*Codex*) and syrup of balsam of tolu, the blue or greenish colour produced is attributed to the alkaline action of the codeine. The yellow colour developed with syrup of balsam of tolu and KI is not attributed to the action of alkali (*Year-Book*, **1903,** 264), but to the presence of a minute trace of copper, derived from the vessels in which that syrup is generally made. The acids of the balsam combine with this, and give rise to the formation of CuI_2 and the liberation of a trace of iodine.

Syrup of Figs. (*Pharm. Centralh.*, **48,** 403.) Semna pods, 60, dried figs, 120, are macerated in water, 580, for 12 hours and strained. In each 330 parts of the strained liquid 450 parts of sugar are dissolved and boiled to clarify. When cold, orange flower water, 20, alcohol, 90 per cent. 20, are added.

Syrups, Blue Deposit in. — Le Bailiff. (*Bull. Sci. Pharmacol.*; *Répertoire* [3], **19,** 11.) A blue deposit is sometimes met with in certain pharmaceutical syrups, particularly those which contain alcohol or ether, such as the syrup of ether and the syrup of codeine of the *Codex*. This is due to the presence of an ultramarine, which is added to beet sugar to remove the yellow tint. The pigment used is quite insoluble in either ether or alcohol.

Syrupus Hypophosph. Co. F. Goldby and H. Finnemore. (*Pharm. Journ.* [4], **24,** 102.) The following are slight modifications of the B.P.C. formula :—(1) Calcium hypophosphite, 80 grs. ; potassium hypophosphite, 40 grs. ; manganese hypophosphite, 40 grs. ; quinine hypophosphite, 20 grs. ; strong solution of ferric hypophosphite, 1 fl. oz. ; strychnine, 1 grain ; hypophosphorous acid, 1 fl. drm. ; refined sugar, 14 oz. ; chloroform water (1 in 200), a sufficient quantity to make 20 fl. oz.

Dissolve the hypophosphites of calcium, potassium and manganese in 8 fl. oz. of the chloroform water ; to this solution add

the strychnine dissolved in the hypophosphorous acid, and then the strong solution of iron hypophosphite. Add the sugar, dissolve without heat, and make the volume to 20 fl. oz. with chloroform water and strain through flannel. The product is of a pale bright yellow colour, of very slight acid reaction, and keeps well. It contains in each fl. drm. the same proportions of hypophosphites as the B.P.C. formula.

An alternate and more expeditious process is to mix the calcium, potassium, manganese, and quinine hypophosphites with 2½ oz. of chloroform water, add the strychnine previously dissolved in the hypophosphorous acid and filter the solution, washing the filter paper with chloroform water till the product measures 3 fl. oz. Mix this solution with 8 fl. oz. of syrup, and the strong solution of ferric hypophosphite with another 8 fl. oz. of syrup. Mix the two syrups; the product should measure 1 pint.

(2) The following formula is due to the late Harold Wilson :—(*a*) Strychnine, 1 grain; hypophosphorous acid, 1 fl. drm. Dissolve. (*b*) Iron ammonium citrate, 40 grs.; citric acid, 60 grs.; strong solution of ammonia, 1 fl. drm.; hypophosphorous acid, 200 ♏; distilled water, 6 fl. drms. Dissolve. Warm gently till red colour disappears, then set aside. (*c*) Calcium hypophosphite, 80 grs.; manganese hypophosphite, 40 grs.; quinine hypophosphite, 2 grs.; sodium hypophosphite, 40 grs.; distilled water, 8 fl. oz.

Dissolve, add the strychnine solution, then the iron solution, and filter. Dissolve 1 lb. of sugar in the filtrate without heat, and make up to 1 pint with water.

Syrupus sennae compositus (Syrup. Senna c. Manna): Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 711.) Crushed senna leaves, 10; crushed star anise fruits, 1; water, 100. Macerate for 12 hours with occasional agitation, and strain. In the strained liquid, dissolve with heat, manna, 2; white sugar, 15.

Tela sericea adhaesiva (Emplastrum anglicum): Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 712.) Isinglass, in fine shreds, 50, is dissolved on the water-bath in water, 1,000, strained, and glycerin, 3, added. The warm solution is then painted on stretched silk taffeta, black, pink, or white. The other side of the material is then painted with a mixture of simple tincture of benzoin, 10; alcohol (90 per cent.), 20; Peruvian balsam, 2.

Tilly's Drops, Balsam of Sulphur, Method of Preparation. C. Pleydell. (*Apoth. Zeit.*, **21, 1906,** 1075.) This old-fashioned remedy still enjoys considerable popularity in Continental domestic medicine, and is official in some pharmacopoeias as *Balsamum sulphuris simplex.* The processes given for preparing it are not very definite in results; the following method of manipulation is preferable:—Sublimed sulphur, 1, and linseed oil, 2, are mixed in a capacious iron or enamelled pot and heated gradually to 175°C., stirring constantly with a wooden stirrer to which a thermometer is attached. At this temperature reaction takes place gradually without the generation of too great heat. When once reaction is well started the heat is lessened until the temperature falls to 160°C. Heat is again applied, as long as a portion being withdrawn and cooled remains liquid. As soon as it sets to a jelly, heating is discontinued, and the hot liquid is strained through muslin into a tared vessel. When it has cooled to 60°C. three times its weight of pure oil of turpentine is stirred in.

Tincture of Cinnamon. F. H. Alcock. (*Pharm. Journ.* [4], **24,** 746.) From the differing statements of other pharmacists, and from his own observations, the author considers that the determination of the solid residue of cinnamon tincture is valueless as a criterion of quality.

Toothache Application. (*Pharm. Zeit.*, **22,** 235.) Cocaine hydrochloride, 1; liquefied carbolic acid, 1; glycerin, 8. To be inserted on cotton wool into the hollow tooth.

Unguentum aromaticum: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 712. Moisten crushed wormwood herb, 100, with alcohol (69 per cent.), 200; and heat with lard, 700, until all alcohol and moisture is driven off. Then strain and press and melt in the fat, yellow beeswax, 180. To the partially cold ointment add expressed oil of bayberries, 88; oil of lavender, peppermint, rosemary and juniper, of each 8.

Unguentum naphtholi co.: Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 712. β-naphthol, 10; calcium carbonate, 5; soft soap, 28; lard, 57. To be freshly prepared.

Valerian, Liquid Extract of: Ph. Danic, 1907. (*Pharm.*

Zeit., **52,** 503.) Valerian root, crushed, 100, is macerated for 12 hours with water, 500 ; it is then distilled to obtain 20 parts of distillate which is reserved. The residue is strained and pressed and the marc again extracted with boiling water, 300. After again straining and pressing, the bulked liquor is evaporated to 300, filtered and further evaporated to 60 fluid parts. The reserved distillate and alcohol 90 per cent., 20, are added to this.

Vapour, Aromatic Disinfectant, for the Sick Room. (*Bull. Comm.*) Eucalyptol, 2 ; oil of thyme, 1 ; oil of lemon, 1 ; oil of lavender, 1 ; alcohol 90 per cent., 20. Mix. A teaspoonful in a pint of water to be evaporated in an open vessel over a spirit-lamp in the room.

Velopural. —. Josepf. (*Pharm. Zeit.*, **52,** 429 ; *Therap. Monats.*, **1907** [5]. By incorporating a soap with sufficient olive oil to bring it to the consistence of an unctuous paste, a useful base for inunction has been obtained, named velopural. By combining 2 parts of this with 1 part of mercury killed by means of lanoline, a very active preparation for mercurial inunction, mercury velopurin, results.

Vinum cascarae sagradae : Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 712.) Liquid extract of cascara, 2 ; white Malaga wine, 3 ; syrup of orange, 1. Mix ; allow to stand for 8 days. Filter.

Vinum condurango : Ph. Austr. VIII. (*Pharm. Centralh.* **47,** 712.) Liquid extract of condurango, 1 ; white Malaga wine, 9. Mix ; allow to stand for 8 days. Filter.

Vinum quininae ferratum : Ph. Austr. VIII. (*Pharm. Centralh.*, **47,** 712.) White gelatin, 1 ; dissolve in hot water, 20, and add to white Malaga wine, 995. Allow to stand for 24 hours, then add a solution of citrate of iron and quinine, 5, in water, 20. Set aside the mixture for at least 14 days in a cool place, agitating frequently. Then filter.

Viscolane, a New Neutral Ointment Basis. —. Klug. (*Journ. Pharm. Chim.* [6], **25,** 293.) A proprietary preparation has been introduced under this name as a new ointment basis. It is claimed to be perfectly miscible with oils, fats, resins or fatty acids. It is greenish in colour, with a faint but not unplea-

sant odour; it is an unctuous body with the consistence of thick honey; neutral and not easily attacked by chemical agents, does not go rancid, and like lanolin, absorbs water. It is well tolerated by inflamed surfaces, eczema and wounds. One method of employing it as a dressing is to dust the surface of the wound with the prescribed drug, then superimpose a thin layer of viscolane over the whole surface. It is specially recommended for granulating wounds, for crural ulcer, and burns.

RESEARCH LIST, 1907

THE following subjects are suggested for investigation; the Executive Committee hope that members of the B.P.C. will undertake to work on one or more of these questions. New subjects have been added to the list to replace those worked out. The Hon. Secretaries wish to call attention to the special fund which exists to defray expenses connected with research work. The Executive Committee will be glad to receive applications from members for grants from this fund.

PLANT ANALYSIS.

1. *Aletris farinosa.* The bitter principle of the rhizome requires investigation. (See *Pharm. Journ.* [3], **17,** 122, 123.)

2. *Bay Berries.* An examination of the bitter principle of the pericarps of bay berries is required.

3. *Belladonna, Stramonium and Henbane.* Determination of the distribution of the alkaloid in the lamina, petiole, mid-rib, small and large stems. (See *Year-Book,* **1906,** 30.)

4. *Calendula.* To what principle is the bitterness of the flowers due ?

5. *Castor Oil.* A research having for its object the isolation of a purgative principle is required. (See *Year-Book,* **1898,** **163,** 184 ; **1901,** 125. *Pharm. Journ.* [4], **5,** 84 ; **11,** 152.)

6. *Chamomile.* Research upon the bitter principle of *Anthemis nobilis.* (See *Bull. de Soc. Chim.* [2], **41,** 483 ; *Year-Book,* **1904,** 266.)

7. *Cimicifuga racemosa* (*Actæa racemosa*). Further information is needed on the chemical nature of the constituents to which the rhizome of the plant owes its activity. (See *Year-Book,* **1885,** 149.)

8. *Damiana* is reported to contain a bitter substance, resins and volatile oil. The liquid extract of the leaves being extensively used, a systematic examination of this drug is desirable.

9. *Euphorbia pilulifera.* Required, a report upon the chemistry of this drug.

10. *Fennel.* Fruits, exhausted or partially so, of essential oil and artificially coloured are met with in commerce. If used in making compound liquorice powder, how can they be detected ?

11. *Hemidesmus indicus.* The extraction and examination of the aromatic body.

12. *Ipecacuanha.* A process for the determination of the several alkaloids in the preparations of this drug.

13. *Mezereon Bark.* What is the chemical nature of the acrid principle of this bark ?

14. *Papaver rhœas.* An examination of the red colouring matter of the petals is required.

15. *Simaruba Bark.* A comparison of the constituents of this drug with those of quassia wood is desirable.

16. *Strophanthus.* An examination of the published methods of separating the different active principles obtained from the seeds is needed with the view of recommending a standard process. (See *Year-Book*, **1898,** 54, 162 ; **1899,** 59 ; **1901,** 167 ; **1906,** 74 ; also *Pharm. Journ.* [4], **6,** 385, 506.) The seeds as met with in commerce are frequently mixed. Further information is desirable as to the active principles they severally contain.

17. *Veratrine.* Should a pure veratrine be included in the British Pharmacopœia rather than the mixture of alkaloids now official ? If so, suggest a process for its purification.

18. *Proximate Analyses* of the following drugs are required : *Cereus grandiflorus, Citrullus colocynthis, Cassia fistula, Serenoa serrulata* (Saw Palmetto), *Arnica montana, Monsonia ovata* and *Monsonia biflora.*

CHEMISTRY.

19. *Ammonii Phosphas.* A rapid method for the assay of this salt.

20. *Acidum Chromicum.* A method for the determination of chromic acid suitable for inclusion in the Pharmacopœia.

21. *Apomorphine.* Do solutions of salts of this alkaloid retain their potency after coloration has taken place ?

22. *Calx Sulphurata.* Commercial samples of this should be examined to ascertain the amount of true sulphide generally present.

23. *Ferri Arsenas.* The official tests supply only the means of determining the amount of ferrous iron present. A simpler

method than those published for the determination of the arsenic content is much to be desired. (See *Pharm. Journ.* [4], **7**, 530; *Year-Book*, **1903**, 572.)

24. *Glycerin.* Required a good method for determining this substance in tinctures, liquid extracts, etc.

25. *Liquor Bismuth. et Ammon. Cit.* A comparison of the different methods suggested for the manufacture of this is required.

26. *Litharge.* Examination of the litharge of commerce, more specially with a view as to its suitability for pharmaceutical purposes, is required.

27. *Solids.* A method is required for the accurate determination of solids in spirituous preparations containing glycerin.

Pharmacopedy and Pharmacy.

28. *Acacia.* An examination of commercial samples of the powdered gum is required.

29. *Aromatic Waters.* A comparison of the quality and keeping properties of aromatic waters prepared by distillation of the drug with those of waters made by solution of the oil.

30. *Bougies.* A simple machine for making bougies by pressure.

31. *Cantharides.* Comparison of the published methods for the assay of this drug.

32. *Cannabis indica.* Required, standard strengths for the official preparations of this drug, and processes for their determination. Experiments are also needed to determine the difference in yield of resin, cannabin and cannabinol between the guaza of Bombay, the ganjah of Calcutta, and other commercial varieties of cannabis.

33. *Compressed Drugs.* A report on the relative suitability of different varieties of starch for promoting disintegration of compressed tablets.

34. *Compound Liquorice Powder.* A report upon commercial samples of this is desirable. See No. 10.

35. *Ergot.* Required a method of determining the relative activity of the official preparations of Ergot.

36. *Ipecacuanha, Liquid Extract of.* Experiments to determine whether the use of lime can be dispensed with in making this are required.

37. *Jaborandi.* The leaves, as imported, are much mixed with stalks. Should the leaves be completely separated from the stalks for the making of official preparations? What is the ether-soluble alkaloidal strength of old leaves, young leaves and stalks? The tinctures of this drug met with in commerce are likely to vary considerably in alkaloidal content. A report on commercial samples would probably prove instructive.

38. *Liquor Sennæ Concentratus.* In this preparation the senna is exhausted by repercolation; in the liquor for preparing Syrupus Sennæ, B.P., a process of double maceration is employed. Which is the better method?

39. *Ointments.* An improved basis is wanted to replace Ungt. Paraffini, B.P., the physical characters of which are unsatisfactory.

40. *Oxydase.* The action of this and other ferments in inducing changes in galenical preparations such as liquid extracts, etc.

41. *Oxymel Scillæ.* What change, if any, takes place when heat is used for making this preparation?

42. *Powdered Drugs.* Experiments on the approximate quantitative determination of the constituents of mixtures of powdered vegetable drugs by means of the microscope.

43. *Quillaia Bark.* Experiments to determine the best menstruum for exhausting this bark for the purpose of making emulsifying agents.

44. *Suppositories.* A method of emulsifying aqueous liquids with theobroma oil in the preparation of suppositories.

45. *Tannin.* Comparative examination of the tannin at present in commerce (solubility in various solvents, moisture, etc.).

46. *Witch Hazel, Distilled Extract of.* The imported article varies much in character and properties. Required, an investigation upon this. (See *Pharm. Journ.* [3], **13**, 524.)

TRANSACTIONS

OF THE

British Pharmaceutical Conference

AT THE

FORTY-FOURTH ANNUAL MEETING

IN

MANCHESTER.

1907

CONTENTS.

British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following:—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2. The minimum subscription shall be *7s. 6d.* annually, which shall be due in advance upon July 1.

3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5. The Officers of the Conference shall be a President, a number of Vice-presidents not exceeding six, by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.

6. At each Conference it shall be determined at what place and time to hold that of the next year.

7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8. The Executive Committee shall present a report of proceedings annually.

9. These rules shall not be altered except at an annual meeting of the members.

10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

*** *Authors are specially requested to send the titles of their Papers to The Hon. Gen Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.*

FORM OF NOMINATION.

I Nominate

(Name)

Address) ..

as a Member of the British Pharmaceutical Conference.

Member

Date . ..

This or any similar form must be filled up legibly, and forwarded to *The Asst. Secretary Brit. Pharm. Conf.*, 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

HONORARY MEMBERS.

Ladenburg, Albert, Ph.D., Hon. M.D., Professor of Pharmacy, University of Breslau, 108, Kaiser Wilhelm-Strasse, Berlin.

Maiden, Joseph Henry, F.L.S., Director of Botanic Gardens and Government Botanist, Sydney, N.S.W.
Mello, J. C. de, Campinas, Brazil.

Petit, A., Rue Favart, 8, Paris.
Prain, David, Lieut.-Colonel, I.M.S., M A., M.B., LL.D. (honoris causâ), Director of Royal Botanic Gardens, Kew.

Remington, J. P., Professor of Pharmacy, College of Pharmacy, 145, North Tenth Street, Philadelphia, United States.

Saunders, W., London, Ontario, Canada.
Schacht, C., Ph.D., 56, Mittelstrasse, Berlin, Germany.

Tschirch, Prof. Dr. A., Direktor des Pharmazeut. Institutes, Der Universität, Berne, Switzerland.

FOREIGN AND COLONIAL MEMBERS.

Abbott, G. W. A., St. Vincent Street, Port of Spain, Trinidad.
Aerstin, Edw. Chas., Colonial Dispensary, Port of Spain, Trinidad, W. I.
Aickin, G , The Pharmacy, Queen Street, Auckland, N.Z. (Year-Book to Evans Sons, Lescher & Webb, Ltd., Bartholomew Close, E.C.).

Backhouse, H. N., 5, Rue de la Paix, Paris.
Baker, C. F., c/o Smith, Stanistreet & Co., Calcutta.
Barcham, J. N., Allan Street, Kyabram, Victoria.
Barnes, J.H., B.Sc., F.I.C., Lyallpur Cutcherry, India.
Barrett, Arthur A., Pozzo Leone 31, Messina.
Bay, A. H., Medical Hall, Rangoon, Burmah.
Bemrose, J., F.C.S., F.I.C., 56, St. Famille Street, Montreal (Year-Book to Horner & Sons, Mitre Square, E.C.).
Bowen, Dr., The Pharmacy, Mombasa, British East Africa.
Branch, G. T., c/o Strachan & Co., Umtali, Rhodesia.
Brownscombe, W. J., Bridge Road, Richmond, Melbourne.
Bull, David G., c/o H. Francis & Co., Bourke St., Melbourne.
Butcher, C., Cronulla, New South Wales.

Champion, G. A., Durban, Natal (Year-Book to Maw, Son & Sons, 11, Aldersgate Street, E.C.).
Chapman, W. H., Corner of St. Catherine and Guy Streets, Montreal, care of Lyman & Co. (Year-Book to Horner & Sons, Mitre Square, E.C.).
Coaker, Norwood, Ladybrand, Orange River Colony.

Cook, G. E., Downing Street, King William's Town, South Africa (Year-Book to Evans Sons, Lescher & Webb, Ltd., 60, Bartholomew Close, E.C.).
Criper, W. R., F.I.C., Konnagur, near Calcutta.
Cox, J. Harry, c/o The Tilden Company, New Lebanon, N.Y., U.S.A.

Day, H. Bartlett, Northam, Western Australia (Year-Book to Evans Sons, Lescher & Webb, Ltd., 60, Bartholomew Close, E.C.).
Dey, Notendra Lall, 4, Beadon Street, Calcutta, India.

Edson, J., Medical Hall, Queen Street, Auckland, New Zealand (Year-Book to Evans Sons, Lescher & Webb, Ltd., 60, Bartholomew Close, E.C.).
Elgie, Simon Kelsey, 47, Gardiner Street, Durban, Natal.
Evans, Alfred B., 32, St. Gabriel Street, Montreal.

Flint, Charles Bruce, Mount Gambier, South Australia.
Forrest, J. K., Jeffcott Street, West Melbourne, Victoria.
Fothergill, J., 37, Avenue Marceau, Paris.
Fritzsche, Karl, care of Messrs. Schimmel & Co., Miltitz, near Leipzic, Saxony.

Garibaldi, J. A., 21, Church Place, Gibraltar.
Garner, W. W., Perth, S.A. (care of F. H. Faulding & Co., 54, Great Tower St., E.C.)
Gasson, W., Kimberley, South Africa (Year-Book to Maw, Son & Sons, 11, Aldersgate Street, E.C.).
Gibb, Andrew, care of Bathgate & Co., 19, Old Court House Street, Calcutta.
Glover, Henry, Mount Gambier, S. Australia.
Gokhale, Dr. K. N., The Indian Pharmacy, Girgaum, Bombay.
Gordon, J. C., 662, Main Street, Winnipeg, Manitoba, Canada.
Grice, Walter T., F.C.S., Messrs. Smith, Stanistreet & Co., Calcutta.
Grimwade, E. Norton, 342, Little Flinders Street, Melbourne (care of Grimwade, Ridley & Co., Muscovy House, Trinity Square, London, E.C.).

Hargreaves, John, 162, Queen Street, Toronto.
Harrison, J. B., M.A., F.I.C., Government Analyst, Georgetown, British Guiana.
Holmes, F., Charles and Brisbane Streets, Launceston, Tasmania.
Hooper, D., F.I.C., F.C.S., Indian Museum, Calcutta.
Hooper, E. G., Church Street, Hawthorn, Victoria.
Hughes, A. E., Elizabeth Street, N. Melbourne.
Huntsman, T., 250, Nicholson Street, Fitzroy, Victoria.
Huot, R. H., 734, Park Avenue, Montreal Annex.
Ingram, Fred, 73, Smit Street, Johannesburg (Year-Book to Maw, Son & Sons, 11, Aldersgate Street, E.C.).

Jones, J. W., care of Smith, Stanistreet & Co., 9, Dalhousie Square, Calcutta.

Leslie, R. A. P., care of Smith, Stanistreet & Co., 9, Dalhousie Square, Calcutta.
Ley, D., East Maitland, New South Wales (Year-Book to Evans Sons, Lescher & Webb, Ltd., 60, Bartholomew Close, E.C.).
Liotard, Ernest, Pharmacien de 1re. classe, F.C.S., Pharmacie Anglo-Américaine, 2, Rue de France, Nice.
London, H., Warrnambool, Victoria.

MacGregor, James, 17, Old Court House Street, Calcutta.
McGaffie, W. A., 146, Queen Street, Brisbane (Year-Book to Maw, Son & Sons, 11, Aldersgate Street, E.C.).
McJannet, Jas., East London, Cape Colony.
Mager, W. K., Queenstown, Cape Colony.
Mather, Enoch, M.A., M.D., D.Sc., LL.D., 80, Park Place E., Detroit, Michigan, U.S.A.
Meiring, J., Worcester, Cape Colony, S. Africa (Year-Book to Evans Sons, Lescher & Webb, Ltd., 60, Bartholomew Close, E.C.).
Mewkill, Henry Jas., St. Arnaud, Victoria.
Miller, C. B., Graaf Reinet, Cape Colony (Year-Book to Lennon, Ltd., 53, Queen Elizabeth Street, S.E.).
Moore, William, F.I.C., Dibrugarh, Upper Assam, India.
Murdock, J. W., 271, Dalhousie Street, Rangoon.
Murray, Leonard E., Colonial Dispensary, Port of Spain, Trinidad, W.I.

Napper, E. H., care of Smith, Stanistreet, & Co., 9, Dalhousie Square, Calcutta.

Ogburn, J., Charlton, Victoria.
Owen, J. H., Wellington (Year-Book to Sharland & Co., 43, London Wall, E.C.).

Paddock, M. V., St. John, New Brunswick.
Pincus, Max, Castlemaine, Victoria.
Plowman, Sidney, F.R.C.S., F.I.C., etc., The Tofts, Frankston, Victoria.
Pond, J. A., Auckland, N.Z.
Poynter, Robt. S., Coleraine, Victoria.

Rainer, C. O., Water Street, George Town, Demerara (Year-Book to S. Maw, Son & Sons, 11, Aldersgate Street, E.C.).
Rich, Stiles W. G., care of Thomason, Chater, Ltd., Brisbane, Queensland.
Richmond, D. S., care of Smith, Stanistreet, & Co., 9, Dalhousie Square, Calcutta.
Rogers, L. D., M.A., M.D., LL.D., Dean of the National Medical University, Chicago, Ill.
Row, W. Edward, George Street North, Sydney, New South Wales.
Ruttonjee, H., 27, Mody Khana Street, Fort, Bombay.
Ryan, Professor, c/o Parke Davis & Co , Detroit, Mich., U.S A.

Samuel, J. B., Mussoorie, India (Year-Book and Letters care of A. Lawrie & Co., 14, St. Mary Axe, E.C.).
Say, S. V. B., Benalla, Victoria.
Scammell, L. R., Adelaide (care of F. H. Faulding & Co., 54, Great Tower Street, E.C.).
Schaer, Prof. Ed., M.D., Pharmaceutisches Institut, Universität, Strassburg.
Shillinglaw, H., Swanston Street, Melbourne, Victoria.
Siebold, Alfred, Enfield, Lacovia P.O., Jamaica.
Smale, F. T., Allahabad, India.
Smith, F. A. Upsher, 635, Lafayette Avenue West, Baltimore, Md., U.S.A.
Smith, H. A. J., Smith & Sons, Ootacamund, India.
Smith, J. D., Smith & Sons, Ootacamund, India.

Smith, W. E., J.P., High Court, Madras, India.
Smith, W. Fraser, care of W. E. Smith & Co., Mount Road, Madras, India.
Sondhi, Maharaj Krishen, Lawrence Medical Hall, Jullundur City, India.
Speechly, E., Kurachi, Scinde, India (Year-Book to Maw, Son & Sons, 11, Aldersgate Street, E.C.).
Spurge, E. C., 619, Buffalo Avenue, Niagara Falls, Ontario, Canada
Squire, F. R., San Remo, Italy.
Stoddart, A. L., 149, Burwood Road, Hawthorn, Victoria.
Swinton, Ralph S., c/o W. J. Bush & Co., Linden, New Jersey, U.S.A.

Taitt, A. J., Colonial Dispensary, Frederick Street, Port of Spain, Trinidad.
Tanner, J. B. H., Nathalia, Victoria
Thomas, H., Croydon, Queensland.
Thomas, H. W., care of Smith, Stanistreet & Co., 9, Dalhousie Square, Calcutta.
Thomas, Lewis, Box 68, Johannesburg (Year-Book to Symes & Co., 14, Hardman Street, Liverpool).
Towl, Chas. E., care of Chas. Ogg & Co., 76, Collins Street, Melbourne, Victoria.
Tremble, J. E., Corner of Mountain and St. Catherine Street, Montreal (Year-Book to Horner & Sons, Mitre Square, E.C., care of Lyman, Sons & Co., Montreal).

Varley, F., Wynberg, Cape Colony (Year-Book to Maw, Son & Sons, 11, Aldersgate Street, E.C.).

Walker, Geo., The Dispensary, Penang (Year-Book to Evans Sons, Lescher & Webb, Ltd., 60, Bartholomew Close, E.C.).
Walsh, A., Adderley Street, Cape Town. (Year-Book and Letters to Lennon, Ltd., 53, Queen Elizabeth Street, S.E.).
Wardleworth, Theo. H., c/o National Drug and Chemical Co. of Canada, Montreal.
Watkins, George, 206, Queen Street, Brisbane, Queensland.
Wheeler, F., Grant Street, Alexandra, Victoria.
Wilkinson, R., Dunedin, New Zealand.
Willet, J. A., Port Elizabeth, Cape Colony.
Woolcott, J. N., Warracknabeal, Victoria.
Woolnough, H.A., 53, Swanston Street, Melbourne.

HOME MEMBERS.

Abraham, Alfred C., F.I.C., F.C.S., 87, Bold Street, Liverpool.
Abraham, T. F., 87, Bold Street, Liverpool.
Acton, F. G., Corn Market, Worcester.
Adam, F., 33, Piggott Street, Birmingham.
Adams, F., 14, The Villas, Stoke-on-Trent.
Adams, William, High Street Shrewsbury.
Adams, W., 191, Dudley Road, Birmingham.
Aitken, R., 73, Princes Street, Edinburgh.
Alcock, F. H., F.I.C., F.C.S., 9, Broad Street Corner, Birmingham.
Alexander, J., 101, South Road, Waterloo, Liverpool.

Alexander, W. G., 14, Portland Place, Leith, N.B.
Allen, B., 125, Hampton Road, Redland, Bristol.
Allen, C. B., 20, High Road, Kilburn, N.W.
Allen, Charles T., 20, High Road, Kilburn, N.W.
Allen, Edward R., 7, Cowper Street, Finsbury, E.C.
Allen, K. C., 7, Cowper Street, Finsbury, E.C.
Allen, W. C., 7, Cowper Street, Finsbury, E.C.
Allen, W. N., 48, Henry Street, Dublin.
Allman, J. D., 23, Kenilworth Road, Ealing, W.
Anderson, A. B. (Exors. of), 38 Princes Street, Dundee.
Anderson, James, High Street, Dundee.
Anderson, John, 14, Strathmartine Road, Dundee.
Andrews, E. A., F.C.S., St. Mary's Hospital, Paddington, W.
Antcliffe, Herbert, The Beeches, Barnsley Road, Sheffield.
Aplin, I. W., 2, High St., Exeter.
Appleton, J. T., The Walkley Pharmacy, Sheffield.
Arkinstall, W., Fernleigh, Market Drayton.
Arnfield, J. C., 7 & 9, Lower Hillgate, Stockport.
Arnold, H. R., 16, Coleman Street, E.C.
Arrandale, J. S., 16, Queen's Gate, Bolton.
Arblaster, C. J., Duchess Road, Birmingham.
Arrowsmith, A. R., 3, Wontner Road, Upper Tooting Park, S.W.
Ashton, C. S., 46, Dyke Road, Brighton.
Ashton, F. W., 11, Addiscombe Road, Croydon.
Aston, W., 27, Montague Street, Worthing.
Atkins, J., Stafford Street, Birmingham.
Atkins, S. R., J.P., The Mount, Elm Grove, Salisbury.
Atkins, W. R., Market Place, Salisbury.
Atkinson, J. G., 25, Westow Hill, Upper Norwood, S.E.
Atkinson, John W., 1A, Birchfield Road, Birmingham.
Atkinson, Leo, 285, Brockley Road, S.E.
Attfield, Prof. J., Ph.D., F.R.S., "Ashlands," Watford, Herts.
Austen, John, 20, Dover Road, Sheffield.
Austen, Josiah, St. Gothard, Minstead Road, Gravelly Hill, Birmingham.
Averill, John, 10, Market Square, Stafford.

Bagnall, Percy, Bow Street, Ashton-under-Lyne.
Bagshaw, Harold, 37, Yorkshire Street, Oldham.
Bain, John, 4, Quadrant, Lime Street, Liverpool.
Bain, John, Penzance House, Bridge of Allan, N.B.
Baker, Parson C., 174, Victoria Street, S.W.
Balcomb, J., 10, Suffolk Parade, Cheltenham.
Ball, A. W., 179, Queen Victoria Street, E.C.
Balmforth, A., 5, Grosvenor Road, Whalley Range, Manchester.
Bannister, W., Victoria Lodge, Cork.
Barclay, Thomas, 19, Lower Priory, Birmingham.
Barclay, Thomas, junr., New Charford Mills, Saltley, Birmingham.
Barfoot, W., Chesterfield.
Barge, John, Belgrave House, Mutley, Plymouth.
Barlow, Alfred H., Oak Avenue, Romiley, Stockport.
Barnes, J. B., F.C.S., 225, Knightsbridge, S.W.
Barlow, Fred, 178, Balsall Heath Road, Birmingham.
Barron, Wm., 1, North Parade, Cheltenham.
Bascombe, F., F.I.C., 17, St. Saviour's Road, Brixton Hill, S.W.
Basker, J. A., F.C.S., 17, Fore Street, Bridgwater.
Batchelor, A. E., 15, West Street, Fareham, Hants.
Bates, F. W., Hygiene House, Brooks's Bar, Manchester.
Bates, J., Arran Lodge, Holly Walk, Leamington.

Batting, T. Gilbert, 16, Calverley Road, Tunbridge Wells.
Baxter, John, Ballymoney.
Baxter, W. J., J.P., M.C.P.S.I., Church Street, Coleraine.
Bayley, Cornelius, Uppingham
Bayley, G. H., Upper Nab House, Shipley, near Leeds.
Bayley, Robert, 330, Victoria Road, Aston Manor Birmingham.
Baylis, A. E., Malvern
Bayne, Thomas, 21, Duke St., Edinburgh.
Beacock, J. H., 20, Upperhead Row, Leeds.
Beggs, G. D., The Dalkey Medical Hall, Dalkey, Co, Dublin.
Bell, E. Wightman, F.C.S., County Agricultural Laboratory, Spalding.
Bell, Joseph, 113, London Road, Manchester.
Bell, W. M., 2, Malvern Road, Kilburn, N.W.
Bellamy, Dr. J. H., Firvale Infirmary, Sheffield.
Bennett, C. T., B.Sc. (Lond.), F.C.S., 57, Larkhall Rise, Clapham, S.W.
Bennett, F. B., 37, King St., Whitehaven.
Bennett, George, 19, Market Place, Stockport.
Bennett, Reginald R., 7, Maze Road, Kew, S.W.
Bennison, E. C., 17, Bull Street, Birmingham.
Bentley, T., 27, Stoke Road, Stoke on-Trent.
Beresford, A. W., Nechell's Green, Birmingham.
Bernard, J. I., 26, Clare Street, Dublin.
Berry, W., F.C.S., F.I.Inst., General Hospital, Bristol.
Bevan, E. J , F.I.C., 4, New Court, Lincoln's Inn, W.C.
Billington, F., 201, Edge Lane, Liverpool.
Bilson, F. E., 1, Lansdown Crescent, Bournemouth.
Bird, F. C. J., Devon Wharf, Emmott Street Mile End, London, E.
Birtwisle, A., Castle Northwich.
Black, H. Milner, 81, St. James Street, Brighton.
Blackbourne, A., 570, Moseley Road, Birmingham.
Blackburn, A. E. H., c/o Messrs. Mottershead & Co., 7, Exchange Street, Manchester.
Blackwell, Josiah. Moor Street, Birmingham.
Blain, A. L., 69, Market Street, Manchester.
Blain, W., 25, Market Street, Bolton.
Blamey, C. A., 9, Goldsmid Road, Brighton.
Blake, C. A., 49, Dover Street, W.
Blake, R. F., F.I.C., F C S., Chemical Dept., Queen's College, Belfast.
Bloomfield, F. H., Central Pharmacy, Pershore Road, King's Norton, Birmingham.
Blore, Moulton, 26, Oldham Road, Manchester.
Blunt, H. R. 70, Sun Hill, Birmingham.
Boa, Peter, 119, George Street, Edinburgh.
Bodie, S. M., The Manor House, Macduff, N.B.
Bolton, C. A., 40, Carlton Street, Nottingham.
Bond, Cyrus H. B., 24, West Heath Road, Chiswell Road, Dudley Road, Birmingham.
Boorne, H. E., 49, Woodstock Road, Redland Green, Bristol.
Booth, S V., 25, Grosvenor Road, Tunbridge Wells.
Botham, Wm., 416, Bury New Road, Higher Broughton, Manchester.
Boucher, H., 59, St. Peter's Road, Handsworth, Birmingham.
Bourdas, I., 48, Belgrave Road, S.W.
Bourdas, Isaiah, junr., 6, Pont Street, Belgrave Square, S.W.
Bourne H. Frederick, 11, Strand, Torquay.
Bowen, J. W., 13, Curzon Street, W.
Braby, F., F.C.S., F.G.S., M.R.I., Bushey Lodge, Upper Teddington, Middlesex.
Bradley, C., 46, Market Place, Reading.

Braithwaite, J. O., Holme-Lacey, Warren Road, Chingford, Essex.
Bramley, W. Miles, 77, Rookery Road, Handsworth, Birmingham.
Branson, F. W., F.I.C., F.C.S., 14, Commercial Street, Leeds.
Brazier, W. N., 6, Fettes Row, Edinburgh.
Breadner, C. G., 1, Elizabeth Street, Cheetham, Manchester.
Breese, J. Soley, Rusholme, Manchester.
Bremridge, R., 17, Bloomsbury Square, W.C.
Brewis, E. T., F.I.C., 31, Belgrave Road, Leyton, Essex.
Bride, W. M., 49, Edgbaston Road, Birmingham.
Bridge, G. E., 128, Old Christchurch Road, Bournemouth.
Briggs, G.W., Sutton in Ashfield.
Bright, R., 29, Broad Bridge Street, Peterborough.
Brodie, R., 253, Crown Street, Glasgow.
Brooks, J., 42, Shudehill, Manchester.
Brown, C., 161, Bury New Road, Manchester.
Brown, D. Rainy, 9 & 11, Moor Lane, Fore Street, E.C.
Brown, David, F.R.S.E., 93, Abbey Hill, Edinburgh.
Brown, J., "Glencoe," 20, Tower Road, Dartford, Kent.
Brown, William C., 341, Bearwood Road, Smethwick, Birmingham.
Browne, H. C., 1, Cornfield Road, Eastbourne.
Bruce, A. L., 9, Millburn Street, Ferryhill, Aberdeen.
Brunker, J. E., M.A., F.C.S., 18, Grosvenor Place, Rathmines, Dublin.
Brunt, G. H., 323, Coventry Road, Birmingham.
Buchanan, D., Kirriemuir, N.B.
Buchanan, J., 6, North Bridge, Edinburgh.
Buck, Anthony S., 179, Bedford Street, Liverpool.
Buckett, A. H., 22, Market Place, Penzance.
Buckingham, H., 279A, Witton Road, Aston Manor, Birmingham.
Buckle, J., 20, Market Place, Malton, Yorks.
Bugden, A., 40, Osborne Avenue, Newcastle-on-Tyne.
Burford, S. F., F.C.S., Halford Street, Leicester.
Burgess, A. H., 37, Stamford New Road, Altrincham.
Burleigh, W. Milner, 3, Woodfield Road, King's Heath, Birmingham.
Burnett, Jos. F., F.C.S., 8, River View, Ashton, Preston.
Burton, Harry, 353, Bearwood Road, Birmingham.
Bush, Alfred W., Ash Grove Works, Hackney, N.E.
Butler, E. H., New Haymarket, Leicester.

Campkin, B. S., 11, Rose Crescent, Cambridge.
Care, H. Bristowe, 25, Esplanade Terrace, Portobello, Edinburgh.
Carmichael, M., 1103, Pollokshaws Road, Crossmyloof, Glasgow.
Carr, Percy, 85–87, Ecclesall Road, Sheffield.
Cart, John Trevor, B.Sc., A.I.C., 4, Simonside Terrace, Heaton, Newcastle-on-Tyne.
Carteighe, M., F.I C., F.C.S., 17 Mortimer Street, W.
Cattell, J. T., Knowle, Warwickshire.
Cave, J. R., 52, Nevill Street, Southport.
Chalmers, W., 42, Cannon Street, E.C.
Chamberlain, P. G., M.A., F.C.S., 3, Market Place, Rugby.
Chaplin, J. H., 60, Westgate, Wakefield, Yorks.
Chapman, Alfd., C., F.I.C., F.C S., 8, Duke Street, Aldgate, E.C.
Chapman, H., 52, Newborough Street, Scarborough.
Chapman, Robert S., Medical Hall, Donegal.
Charnley, C., The Grove, Wilmslow, Manchester,
Chase, T., Egbaston, Birmingham.
Chaston, A. E., 45, High Street, Winchester.
Chater, E. M., 129, High Street, Watford.
Cheney, Henry R., 21, High Street, Leominster.

Chesterfield, T. M., 190, Canterbury Street, Gillingham, Kent.
Chesterton, W. P., 46, Hampton Street, Birmingham.
Cholerton, Alf. F., 40½, Belgrave Gate, Leicester.
Church, Prof. A. H., M.A., D.Sc., F.R.S., F.S.A., Shelsley, Kew Gardens, Surrey.
Church, E. H., 18, St. Andrew's Street, Cambridge.
Clague, Thos. Maltby, 11, Grey Street, Newcastle-on-Tyne.
Clare, Jno., 1, Harcourt Place, Scarborough.
Clark, W. Inglis, D.Sc., 104, 106 & 108, South Canongate, Edinburgh.
Clark, J., 137A, Pilgrim Street, Newcastle-on-Tyne.
Clark, J. A., 57, Weston Park, Crouch End, N.
Clark, Richard, J.P., D.L., 17, Smith's Place, Leith.
Clarke, C. Goddard, M.P., J.P., L.C.C., 60 to 64, Artillery Lane, E.
Clarke, E. J., Malvern Wells.
Clarke, F., 64, Park St., Southwark, S.E.
Clarke, J., 38, George Street, Croydon.
Clarke, R. Feaver, 21, High Street, Gravesend.
Clarke, W. J., 153B, High Street, Stockton-on-Tees.
Clayton, Christopher, 158, Cowley Road, Oxford.
Clayton, F. C., 18, St. James' Road, Birmingham.
Clegg, Joseph, Norwood, Swinton, Manchester.
Cleworth, John, 56, Ducie Street, Oxford Road, Manchester.
Clinton, Bridget Rose, 19, North Earl Street, Dublin.
Coats, J. T., "Gowanburn," Trinity Road, Edinburgh.
Cockburn, B., Orrock Manse, Hawick, N.B.
Cockburn, C. T., 130, Howard Street, Glasgow.
Cocker, J. B., 159, Butler Street, Ancoats, Manchester.
Cofman, Joseph, 41, Hart Street, New Oxford Street, W.C.
Colchester, W. M., 53, Coronet Street, Hoxton, N.
Cole, F., Droitwich.
Coleman, A., 55, Commercial Road, Newport, Mon.
Coleman, J. H., 7, Worcester Street, Wolverhampton.
Coley, S. J., 57, High Street, Stroud, Gloucestershire.
Collen, Creswell, 78, St. John's Road, Clapham, S.W.
Colley, Walter, 151 and 153 Sherlock Street, Birmingham.
Collins. H. G., Staines Road, Upper Sunbury Middlesex.
Collis, A. F., 11, Abbey Churchyard, Bath.
Coltart, A., 17, Bull Street, Birmingham.
Connor, J. E., Ph. Ch., M.C.P.S., of Ireland, 79, Hill Street, Newry.
Conyngham, Hy., 32, Upper Baggot Street, Dublin.
Cookson, Joseph, 130, Price Street, Birkenhead.
Cooley, W. B., F.C.S., 5, Dudley Street. Wolverhampton.
Cooling, Francis C., Christchurch Road, Oxton, Birkenhead.
Coombe, F. E., 106, Stafford Road, Wolverhampton.
Cooper, A., F.C.S., 80, Gloucester Road, South Kensington, S.W.
Cooper, A. J. Bullen, Grimston Lawn, Ealing.
Cooper, G. H., 582, Oldham Road, Failsworth, Manchester.
Cooper, W. M., 110, South View Road, Sharrow, Sheffield.
Cope, Arthur G., Mardol, Shrewsbury.
Cope, John A., 3 Market Place, Derby.
Corfield, Edward, 26, Bennett Hill, Birmingham.
Cortis, A. B., F.C.S., 30, South Street, Worthing.
Cosh, A. L. S., 39, Larkspur Terrace, Newcastle on-Tyne.
Costerton, H. A., 140a, Western Road, Brighton.
Coupland, H. S., 4, Cato Road, High Street, Clapham, S.W.
Coverdale, A. E., 68, Broad Street, Worcester.
Cowie, William Beaverly, Principal, Edinburgh Central School of Pharmacy, 26, Clyde Street, Edinburgh.

Cowley, R. C., 6, Sandon Terrace, Upper Duke Street, Liverpool.
Crawshaw, E., F.R.G.S., F.R.M.S., 80, Fann St., Aldersgate St., E.C.
Crewe, Philip H., c/o Messrs, Jas. Woolley, Sons & Co., Victoria Bridge, Manchester,
Cripps R. A., F.I.C., The Laboratory, d'Avigdor Road, Hove, Sussex.
Critchlow, Henry, 161, Monument Road, Birmingham.
Crofts, L. G., 6, Melton Road, King's Heath, Birmingham.
Crombie, James, 257, Paisley Road West, Glasgow.
Crompton, Henry, 16, Park Hills Road, Bury.
Cross, W. Gowen, J.P., 70, Mardol, Shrewsbury.
Crossley-Holland, F. W., M.C.S. (Paris), 33, Grantham Road, Stockwell, S.W.
Crossley, Prof. A. W., D.Sc., Ph. D., 17, Bloomsbury Square, W.C.
Crouch, W. S., 283, Fulwood Road, Sheffield.
Cullwick, J. H., 345, Hagley Road, Birmingham.
Cummings, Wm., 49, Reform Street, Dundee.
Currie, Archibald, 162, Ferry Road, Leith.
Currie, W. L., 223, Byres Road, Glasgow.
Curry, Frank, Snow Hill Buildings, E.C.
Cussons, J. W., Lilley Street Works, Queen's Road, Manchester.
Cuthbert, R., 12, Westgate, Huddersfield.
Cuxson, J. (Cuxson, Gerrard & Co.), Corporation Street, Birmingham.
Cuxson, P. W., Aldridge Road, Perry Bar, Birmingham.

Dallow, Charles E., 352, Monument Road, Birmingham.
Darling, W. H., F.I.C,. F.C.S., 26, Dover Street, Oxford Road, Manchester, S. E.
Davenport, H., 117 Union Street, S.E.
Davidson, A., 172, High Street, Montrose, N.B.
Davidson, P., 342, High Road, Brondesbury, N.W.
Davies, Griffith, 382, Fulwood Road, Sheffield.
Davies, J. T., 13, Walter Road, Swansea.
Davies, W. J., 101, Church Street, Brighton.
Davis, E., 29, Commercial Street Newport, Mon.
Davis, J., 39, Summer Lane Birmingham.
Davis R.Hayton, F.C. S. Regent Parade, Harrogate.
De Morgan, F. Filmer, 19a, Firs Mansions, Fortis Green Road, N.
Deane, Harold, B.Sc., A.I.C., 34, Drakefield Road, Upper Tooting, S.W.
Delve, W. H., 310, Stretford Road, Manchester.
Dickson, J. Scott, 36, Normanton Terrace, Newcastle-on-Tyne.
Dixon, Rowland, Hunter's Bar, Sheffield.
Dixon, Prof. W. E., M.D., M.A., Pharmacological Laboratory, Cambridge.
Dobbin, Leonard, Ph.D., Chemistry Department, The University, Edinburgh.
Dobinson, T., 125, Newgate Street, Bishop Auckland.
Dodd, W. Ralph, F.C.S., "Frederwen," Village Road, Enfield, N.
Dolbear, John, 108, High Street, Oxford.
Donald, James J., 29, George Street, Perth.
Dott, D. B., F.R.S.E., F.I.C., 93, Abbeyhill, Edinburgh.
Douglas, Robt. D., 283, Fulwood Road, Sheffield.
Douglas, W. B., 1, Victoria Parade, Torquay.
Downes, F., Altrincham.
Drayton, Ernest, William Street, Herne Bay.
Driver, J. G., 70, St. Mary's Road, Garston, Liverpool.
Druce, G. Claridge, M.A., F.L.S., Yardley Lodge, Crick Road, Oxford.
Drysdale, J. W., 16, Fish Street Hill, E.C.

Dudderidge, F. R., F.C.S., Brecknock House, Blandford.
Duncan, A. W., F.C.S., Trafalgar Road, Pendleton, Manchester.
Duncan, W., F.C.S., Royal Dispensary, 21, West Richmond Street, Edinburgh.
Dunlop, T., Albert Cross, Pollokshields, Glasgow.
Dunlop, T. W., 20, Beulah Hill, Norwood, S.E.
Durrant, G. S., 1, Old Cross, Hertford.
Dutton, H. O., 2, King Street, Rock Ferry, Birkenhead.

Eardley, J. F., 265, Glossop Road, Sheffield.
Edwards, W. J., 27, Trinity Road, Birchfields, Birmingham.
Ellinor, G., The Pharmacy, 127, Spital Hill, Sheffield.
Elliott, H. A., Evesham.
Elliot, W. M., High St., Coldstream, N.B.
Ellis, Fredk. R., F.C.S., 15, Shadwell Road, Bishopston, Bristol.
Escritt, H. T., 102, High Road, Streatham, S.W.
Etherington, Leonard, 20, Sandy Lane, Royton, Lancs.
Evans, Sir Edward, J.P., 56, Hanover Street, Liverpool.
Evans, E. J., North Parade, Aberystwith.
Evans, J. H., Medical Hall, Market Cross, Lymm.
Evans, J. H. E., 56, Hanover Street, Liverpool.
Evans, J. J., J.P., 56, Hanover Street, Liverpool.
Evans, J. N., 56, Hanover Street, Liverpool.
Evans, John, F.I.C., F.C.S., City Analyst's Laboratory, Sheffield.
Evans, Kenneth W., 56, Hanover Street, Liverpool.
Evans, W. P , 56, Hanover Street, Liverpool.
Ewell, R. M., 37, Town Wall Street, Dover.
Ewing, Jas. Laidlaw, J.P., 104, South Canongate, Edinburgh.
Exley, J., 34, Hunslet Lane, Leeds.
Eynon, C. E. J., 13, James Street, Harrogate.

Fairclough, R. A., c/o Messrs. Lennon, Ltd., 54 to 58, Queen Elizabeth Street, S.E.
Fairley, T., F.R.S.E., F.I.C., F.C.S., 17, East Parade, Leeds.
Fairweather, E. B., F.C.S., King's College Hospital, W.C.
Farr, E. H., F.C.S., The Laboratory, Uckfield, Sussex.
Farries, Thos., F.I.C., F.C.S., 16, Coleman Street, E.C.
Featherstone, W. B., F.C.S., 123, Sandford Road, Moseley, Birmingham.
Ferrall, A. T., 67, Lower Mount Street, Dublin.
Ferrier, D. H., 2, Hilltown, Dundee.
Fielding, P. J. D., F.C.S., F.S.M.C., 66, Patrick Street, Cork.
Finlay, J., The Pharmacy, Kilrush, Co. Clare.
Finnemore, H., B.Sc., F.I.C., Guy's Hospital, S.E.
Fisher, G. F. L., Fore Street, Topsham.
Fisk, F. M., 50, Bear Street, Regent Street, W.
Fitzgerald, A. H., 1, King's Parade, Muswell Hill, N.
Fletcher, F. W., F.C.S., Beauchamp Lodge, Enfield, Middlesex.
Foggan, George, Leadgate House, Bedlington, Northumberland.
Forbes, James, 6, Ocklynge Parade, Eastbourne.
Forbes, John J., F.S.M.C., 9, Broad Street, Denny, N.B.
Ford, J., High Street, Kirriemuir, N.B.
Forret, J. A., 26, Brougham Place, Edinburgh.
Forshaw, Chas. F., M.D. (Chicago), LL.D., D.D.S., F.R.S.L., F.R.H.S., F.R.C.I., F.C.S. (Berlin), Baltimore House, 26, Hanover Square, Bradford, Yorks.
Forster, Wm., 30, Church Street, Seaham Harbour.
Foster, John, 479, Sauchiehall Street, Glasgow.

Foster, Murray Toogood, Collumpton, Devon.
Foster, Reginald Le Neve, J.P., F.C.S., Bollindene, Wilmslow, Cheshire.
Fox, A. Russell, F.L.S., 8, Castle Street, Sheffield.
Fox, C. E., 109, Bethnal Green Road, E.
Francis, Alan, 38 and 40, Southwark Street, S.E.
Francis, Geo. Bult, F.C.S., 38 & 40, Southwark Street, S.E.
Francis, Wm. Hy., 150, York Road, Lambeth, S.E.
Franklin, A. J., 86, King's Road, Brighton.
Franklin, J. H., 374, Bury New Road, Manchester.
Fraser, Alexr., 100, High Street, Paisley, N.B.
Fraser, J. Innes, 9, Dundas Street, Edinburgh.
Freeman, A. O., c/o Messrs. Snape & Son, Villa Road, Handsworth, Birmingham.
Freeman, E., 6, Market Place, Ledbury, Herefordshire.
Freeman, John, 109, Icknield Street, Birmingham.
Freeman, W. Marshall, 1, Waterloo Street, Birmingham.
Fudgé, C. W., Shepton Mallet.

Gadd, H., J.P., 97, Fore Street, Exeter.
Gadd, H. Wippell, F.C.S., 97, Fore Street, Exeter.
Gadd, Sydney Chas., 97, Fore Street, Exeter.
Galloway, P. H., 8, Baden Place, Crosby Row, Long Lane, Borough, S.E.
Gamble, F. W., 7, Vere Street, W.
Garnett, Henry, F.C.S , 48, Deansgate, Manchester.
Garsed, Wm., 18, Victoria Road, Elland, Yorks.
Gateley, S. W., 153, Dudley Road Birmingham.
Gee, Ernest 76, Lozells Road, Aston Manor, Birmingham.
Geeves, Charles M., 34, Leinster Terrace, Lancaster Gate, W.
George, E. J., 54, Bescot View, Walsall.
Gerrard, A. W., F.C.S., 35, Queen's Road, Wimbledon, S.W.
Gibbs, Sydney, 53D, Terminus Road, Eastbourne.
Gibson, F. J., 93, Darlington Street, Wolverhampton.
Gibson, M. H., Christ Church Corner, Burton-on-Trent.
Gibson, R., Erskine Street, Hulme, Manchester.
Gibson, S., Summerhill, Dunmerry, Co. Antrim.
Gibson, W. H., F.C.S., 122, King's Road, Brighton.
Gibson, Wm. Jas., Montpelier House, Malone Road, Belfast.
Gifford, R. Lord, Blackburn.
Gilderdale, F., F.C.S., c/o John Ismay & Sons, Newcastle-on-Tyne.
Giles, W., 123, Crown Street, Aberdeen.
Gill, H. E., 97, Heneage Street, Birmingham.
Gill, Jos., W. 247, Ellor Street, Pendleton, Manchester.
Gilmour, J. P., 312, Cathcart Street, Glasgow.
Gittoes, Samuel J., 56, Lower High Street, Wednesbury.
Glass, Wm. Stephen, 50, North Bridge, Edinburgh.
Glyn-Jones, W. S., Endsleigh, Palmer's Green, London, N.
Goldby, F., The Enfield Pharmacy, Enfield Town, N.
Goldfinch, G., F.C.S., 7, Church Walk, Hendon, N.W.
Goldon, H. V., M.C.P.S.I., Birr.
Goldthorpe, Arthur, 70, Herbert Road, Plumstead, S.E.
Goodall, F. C., 72, Great Russell Street, W.C.
Goodwin, F. A., 79, Mutley Plain, Plymouth.
Gostling, T. P., Linden House, Diss.
Gough, J. H., F.C.S., 65, Grange Avenue, Chapeltown Road, Leeds.
Graham, F. A., Norton Road, Stockton-on-Tees.
Gray, John, 128A, Nethergate, Dundee.

Green, S., 60, Nunhead Lane, Nunhead, S.E.
Greenish, Prof. H. G., F.I.C., 17, Bloomsbury Square, W.C.
Grier, Jas., Pharmaceutical Dept., The University, Manchester.
Griffith, M. Henry, 23, Market Place, Great Bridge, Staffs.
Grffiiths, E. H., Market Street, Kidsgrove, Staffs.
Griffiths, Dr. John S., 25, Redland Park, Redland, Bristol.
Griffiths, W., 134, Market Place, Cirencester.
Grimes, H. C., Maryville, Carysfoot, Avenue, Blackrock, Dublin.
Grimwade, E. W., Muscovy House, Trinity Square, E.C.
Grose, N. M., 8, Temple Street, Swansea.
Groves, R. H., Blandford.
Guiler, J., 89, Ormeau Road, Belfast.
Gulliver, W. F., 6, Lower Belgrave Street, Pimlico, S.W.
Guy, Fredk., 12, North Street, Brighton.
Gwatkin, J. R., 49, Grand Parade, Brighton.

Haddock, J., c/o Ayrton, Saunders & Kemp, 34, Hanover Street, Liverpool.
Hall, S. W., Duddeston Mill Road, Birmingham.
Hall, F. J., 27, Broad Street, Worcester.
Hallaway, J., 5, Devonshire Street, Carlisle.
Hallawell, J., Florenceville, Vincent Road, Croydon.
Haller, Geo., 52, Leadenhall Street, E.C.
Hallett, Wm. J., 10, Stall Street, Bath.
Hamilton, T. S., 135, Ellor Street, Pendleton, Manchester.
Hampshire, C. H., 19, Brook Street, Ilkley, Yorks.
Hanbury, C., F.I.C., F.C.S., Plough Court, Lombard Street, E.C.
Hanbury, F. Capel, Stainforth House, Upper Clapton, N.E.
Hanbury, F. J., F.L.S., Stainforth House, Upper Clapton, N.E.
Hankinson, W., 70, Richmond Grove, Manchester, S.E.
Hanson, A., 3, High Street, Queensbury, Bradford, Yorks.
Hanson, A. W., High Street, Sidcup.
Hardie, J. M., 68, High Street, Dundee.
Harding, Edward, 632, Stockport Road, Manchester.
Hardwick, Stewart, 21, Commercial Road, Bournemouth.
Hardy, W. J., M.C.P.S.I., 20, Castle Place, Belfast.
Harkness, John, 7, Hope Park Crescent, Edinburgh.
Harland, R. H., F.I.C., F.C.S., 37, Lombard Street, E.C.
Harmer, G. A., 47, South Street, Eastbourne.
Harries, A. H., 218, Heathfield Road, Handsworth Road, Birmingham.
Harrington, A. G., "Rochford," Westbury Road, Ealing, W.
Harrington, J. F., 45, Kensington High Street, W.
Harris, S., Droitwich.
Harrison, E. F., B.Sc., F.I.C., 55, Chancery Lane, W.C.
Harrison, J., 33, Bridge Street, Sunderland.
Harrison, R. Casswell, Grayshott, Haslemere, S.O. Surrey.
Harrison, W. B., 6, Bridge Street, Sunderland.
Harrop, T. H., 239, Broad Street, Pendleton, Manchester.
Hart, Frank (James Hart & Son), 130, Newport Street, Bolton.
Hartridge, J. Hills, Holmwood, Hendon, N.W.
Harvey, S., F.I.C., F.C.S., South Eastern Laboratory, Canterbury.
Harvey, Harold M., 17, Bloomsbury Square, W.C.
Hatch, R. M., L.D.S., R.C.S., D.D.S., Claremont House, Whiteladies' Road, Clifton, Bristol.
Havill, P. W., 27, Fore Street, Tiverton, Devon.
Hawkins, T., 56, Ludgate Hill, E.C.
Haworth, Henry, 245, Stockport Road, Levenshulme, Manchester.
Hay, W. F., 29, Rose Street, Aberdeen.

Hayhoe, W., 45, Cromwell Road, Pokesdown, Bournemouth.
Hayles, B. H., Holm Hurst, Hadley Road, New Barnet.
Hearder, H. P., 26, Westwell Street, Plymouth.
Hearle, J., 33, Liverpool Road, Islington, N.
Hearn, John, 38, Southwark Street, S.E.
Henderson, H. J., King Street, Hitchin.
Hendry, R. L., 27, Earl Grey Street, Edinburgh.
Henry, Claude F., 1, Brandon Terrace, Edinburgh.
Henry, H. Lee, 19, High Street, Lewisham, S.E.
Hershberg, Alfred, 77, Cheetham Hill Road, Manchester.
Heslop, Charles W. B., 36, The Gardens, East Dulwich, S.E.
Hewitt, Silas, The Avenue Pharmacy, Ashton-under-Lyne.
Hewlett, John C., F.C.S., 35–42, Charlotte Street, Great Eastern Street, E.C.
Hicks, W. T., 28, Duke Street, Cardiff.
Hill, C. A., B.Sc., F.I.C. 64, Park Street, S.E.
Hill, J. Rutherford, 36, York Place, Edinburgh.
Hill, T., 115, Birchfield Road, Birmingham.
Hills, J., Stuart, A.I.C., F.C.S., 225, Oxford Street, W.
Hills, Walter, F.C.S., 225, Oxford Street, W.
Hirst, Benj., Millgarth Mills, Leeds.
Hirst, A. Norman, Baddiley Rectory, Nantwich.
Hitchman, H., Market Place, Kettering.
Hobbs, A. E., 33, Mount Pleasant, Tunbridge Wells.
Hodgkinson, C., 64, Park Street, Southwark, S.E.
Hodgson, Harold Fredk., 60, High Street, Brentwood, Essex.
Holding, John, 169, Hemingford Road, Barnsbury, N.
Hollick, Richard, 268, Burbury Street, Aston Manor, Birmingham.
Holmes, E. M., F.L.S., 17, Bloomsbury Square, W.C.
Holmes, W. M., Sutton, Surrey.
Holroyd, James, Wellington Road, Ashton-under-Lyne.
Holroyd, W. H., 31, Duke Street, St. James, S.W.
Hope, John, 332, Deansgate, Manchester.
Hopkinson, W. J., 66, Southwark Bridge Road, S.E.
Hopley, John H., 6, Northgate Street, Chester.
Hornby, F. W., 132, Christchurch Road, Boscombe, Bournemouth.
Horniblow, F. H., 33, Sidbury, Worcester.
Horniblow, W. T., 33, Sidbury, Worcester.
Horsfield, F., Swanland House, Swanland Avenue, Bridlington.
Hoseason, J.H., Sun Buildings, Bridge Street, Manchester.
Hough, R., Sun Buildings, Bridge Street, Manchester.
Howard, D., F.I.C., F.C.S., Devon House, Buckhurst Hill, Essex
Howard, D. Lloyd, F.C.S., City Mills, Stratford, E.
Howard, George, Ph.C., 81, Calverley Road, Tunbridge Wells.
Howard, W. D., F.I.C., 11, Cornwall Terrace, Regent's Park, N.W.
Howard, Wm. Henry, 2, Lincroft St., Moss Side, Manchester.
Howes, Henry, 238, Bristol Street, Birmingham.
Howie, W. L., F.R.S.E., Hanover Lodge, West Hill, Harrow-on-the-Hill.
Howlett, H. J., 31, High St., Winchester.
Hughes, J., 14, Wind Street, Swansea.
Hughes, J., Tything, Worcester,
Hughes, W. Griffiths, 17, Deansgate, Manchester.
Hugill, J. H., 14 & 15, Miles Lane, Cannon Street, E.C.
Hugill, Thos. P., 16, Mincing Lane, E.C.
Hull, John W., 47, Wentworth Road, Harborne, Birmingham.
Hume, John W. D., Grove Pharmacy, Lowestoft.
Humphrey, John, 17, Bloomsbury Square, W.C.

Hunt, F. Wm., 106, Old Town Street, Plymouth.
Huntley, J., 34, Horsefair, Kidderminster.
Huskisson, H. O., F.I.C., F.C.S., F.L.S., Swinton Street, Gray's Inn Road, W.C.
Hutton, H., 42, Parade, Leamington.
Hutton, John, 8, High Street, Brechin.

Idris, H. W., 120, Pratt St., Camden Town, N.W.
Idris, T. H. Williams, M.P., J.P., F.C.S., 120, Pratt St., Camden Town, N.W.
Idris, W. H. W., 120, Pratt St., Camden Town, N.W.
Idris, W. T. W., 120, Pratt Street, Camden Town, N.W.
Iliffe, G., 29, Market Place, Nuneaton.
Ince, J., F.L.S., F.C.S., F.R.M.S., "Glenholme," 13, Alfred Road, Acton, W.
Inglis, Frank, 36, Heaton Moor Road, Heaton Chapel, near Stockport.
Innes, David, 47, Melbourne Street, Stalybridge.

Jackson, D., 169, Holyhead Road, Wednesbury.
Jackson, G., 870, Rochdale Road, Manchester.
Jackson, H., 13, South Charlotte St., Edinburgh.
Jackson, H., King's College, W.C.
Jackson, J., c/o Messrs. Harrison, Parkinson & Co., Sun Bridge Road, Bradford, Yorks.
Jackson, J. Gilbert, 338, Abbeydale Road, Sheffield.
Jackson, Urban A., Ph.D., F.C.S. 16, Mary Street, Manchester.
Jackson, W. H., 10, High Street, Crediton.
James, H. P., 13, Briggate, Leeds.
James, W. D. (late H. J. Bates & Co., Ltd.), Old Benwell, Newcastle-on-Tyne.
Jamieson, W., M.C.P.S.I., Town Hall Street, Belfast.
Jeans, A., 151, Oxford Road, Manchester.
Jeans, T. R., 1, Broad Street, Pendleton, Manchester.
Jelly, G. W., 36, Smithford Street, Coventry.
Jennings, Cornelius, Coventry Road, South Yardley, Birmingham.
Jennings, J. A., London Hospital, E.
John, William D., 104, Bute Docks, Cardiff.
Johnson, J. C., Warwick Road, Acocks Green, Birmingham.
Johnston, Wm. Vincent, 9, Ranelagh, Dublin.
Johnstone, C. A., c/o Messrs. Woolley, Sons & Co., Victoria Bridge, Manchester.
Johnstone E. S., 12, Victoria Bridge Street, Manchester.
Johnstone, Walter, Cromarty, N.B.
Jones, E. Oswald, 42, King Street, Brynmawr, Breconshire.
Jones, Edmund, Miles Bank, Hanley.
Jones, Edwin, 108, Queen's Road, Bayswater, W.
Jones, E. W. T., F.I.C., F.C.S., Public Analyst, 10, Victoria Street, Wolverhampton.
Jones, H. W., F.C.S., F.R.M.S., Spencer Park, Coventry.
Jones, R. H., 88, Norwood Road, S.E.
Jones, W. A., 3, Renshaw Buildings, Renshaw Street, Liverpool.
Jones, W. Cadwalader, 4, Queen's Road, Bayswater, W.
Jowett, H. A. D., D.Sc., Wansfell, Church Avenue, Sidcup, Kent.
Joyce, T. G., B.Sc., F.I.C., F.C.S., c/o Messrs. Lorimer & Co. Britannia Row, Islington.

Kay, J. P., 205, Union Street, Aberdeen.

Kay, T., J.P., Renshaw Street, Stockport.
Kelly, Albert E., Bræfoot Cottage, Liberton, Edinburgh.
Kelly, Patrick, 16, South Richmond Street, Dublin.
Kemp, H., Chorlton-cum-Hardy, Manchester.
Kemp, W. H., 34, Hanover Street, Liverpool.
Kemsey-Bourne, C., 255, High Street, West Bromwich.
Kennett, John Nash, Church Street, Weybridge.
Kent, B. J., Lindismead, 32, Spilsby Road, Boston.
Kent, C., Phœnix Mills, Dartford, Kent.
Kerfoot, E. H., Springwood Hall, Ashton-under-Lyne.
Kerfoot, T., Bardsley Vale Mills, Ashton-u.-Lyne.
Kermath, W. R., Greyfriars Garden, St. Andrews, Fife.
Kerr, C., 56, Nethergate, Dundee.
Kerse, Wm., c/o John Ismay & Sons, City Road, Newcastle-on-Tyne.
Kidd, J. C., 551, Cheetham Hill Road, Manchester.
Kiloh, James, 103, Patrick Street, Cork.
Kinch, Prof. Ed., F.I.C., F.C.S., Royal Agricultural College, Cirencester.
Kirby, F. Benson, 128, Ashley Road, Bristol.
Kirby, Cyril H., 21, Lime Street, E.C.
Kirkby, W., F.C.S., F.L.S., F.R.M.S., Winster House, Thornfield Road, Heaton Moor, Stockport.
Kluge, H. J., 13, Curzon Street, W.
Knight, G. J., 452, Edgware Road, W.
Knights, J. West, F.I.C., F.C.S., County Laboratory, 67, Tenison Road, Cambridge.
Knott, P., 1, Blackburn Road, Bolton.

Lake, J. H., 41, High Street, Exeter.
Lambie, Hugh, 22, Nithsdale Road, Strathbungo, Glasgow.
Lancaster, B., 68, Holme Lane, Sheffield.
Lane, W., 8, Albert Road, Whalley Range, Manchester.
Lang, W. H., 19, Lower Priory, Birmingham.
Latchmore, A., Chiltern Road, Hitchin.
Latreille, A., 48, Baker Street, Portman Square, W.
Law, T. W. T., 380, Hamilton Place, Partick, Glasgow.
Lawson, John, 256, Burley Road, Leeds.
Layman, Chas. N., 48 and 50, Southwark Street, London, S.E.
Layman, F. N., 48 & 50, Southwark Street, London, S.E.
Le Dain, Nicholas, Penn's Pharmacy, Erdington, Birmingham.
Lee, S. Wright, 6, 8 & 10, Whitechapel, Liverpool.
Lees, J., 110, Lees Road, Oldham.
Leith, Peter, 43, Victoria Street, Rothesay, N.B.
Lennox, James, 6, Queen Margaret Place, North Kelvinside, Glasgow.
Lenton, W. H., Belmont, Long Metford.
Lescher, F. Harwood, F.C.S., 60, Bartholomew Close, E.C.
Lescher, T. E., 60 Bartholomew Close, E.C.
Lester, J. H., Royal Exchange, Manchester.
Lester, T. R., 107, Patrick Street, Cork.
Levi, Caleb, Oakdene, Wellington Street East, Higher Broughton, Manchester.
Lewis, David, 289, Broad Street, Pendleton, Manchester.
Lewis, D. L., 36, Haven Green, Ealing, W.
Lewis, S. Judd, B.Sc. (Lond.), A.I.C., 122, Newington Causeway, S.E.
Lindsay, Robert, Peebles.
Liverseege, J. F., F.I.C., Council House, Birmingham.
Lloyd, J. W., 30, Mount Pleasant, Liverpool.
Lloyd, T. Howard, St. James Street, Humberston Road, Leicester.

Lockyer, W. J., F.C.S., Bridgwater Lodge, Epple Bay Road, Birchington-on-Sea, Kent.
Long, F. C., 35, Otley Road, Headingley, nr. Leeds.
Longstaff, W. L., 811, Fulham Road, S.W.
Lord, Walter, 158, Hyde Road, Gorton, Manchester.
Lorimer, J., Britannia Row, Islington, N.
Lothian, John, Principal, Glasgow School of Pharmacy, 180, West Regent Street, Glasgow.
Lowther, Tom W., 131, Alcester Road, Moseley, Birmingham.
Loxter, T. E., 60, Bartholomew Close, E.C.
Lucas, E. W., F.I.C., F.C.S., 225, Oxford Street, W.
Lucas, Harry, 186, Clapham Road, S.W.
Lunan, G., 20, Queensferry Street, Edinburgh.
Lunn, Thomas, 38, Tything, Worcester.

Maben, T., F.C.S., 63, Stradella Road, Herne Hill, S.E.
Macawra, Gerald Joseph, M.D., C.M., 1, Chapel Lane, Headingley, Leeds.
Macdonald, A., 109, Abbey Hill, Edinburgh.
Macdonald, D. Baird, F.C.S., c/o E. H. Butler & Son, Humberstone Gate, Leicester.
MacEwan, P., F.C.S., 64, Southwood Lane, Highgate, N.
Macfarlane, M., 19, East High Street, Forfar.
Macfarlane, T. B., 17, Main Street, Wishaw, N.B.
Macintyre, John, 34, High Street, North Berwick.
Mackay, G. D., Canning Street, Edinburgh.
Mackenzie, Donald, 54, Denton Road, Hornsey, London, N.
Mackenzie, J. C., 71, Parade, Birmingham.
McAdam, R., 32, Virginia Street, Glasgow.
McCombie, C., c/o May & Baker, Ltd., Garden Wharf, Battersea, S.W.
McCorquodale, J. C., The Pharmacy, Markinch, Fife.
McDougall, Isaac, 68, Port Street, Manchester.
McLaren, David, 42, South Clerk Street, Edinburgh.
McMullan, Thomas W., 42, Victoria Street, Belfast.
McMurray, James, 37, West Clyde Street, Helensburgh.
McNay, David, 2, Bank Street, Kilmarnock.
McWalter, J. C., M.A., M.D., D.P.H., F.F.P.S. (Glas.), 19, North Earl Street, Dublin.
Mair, Wm., F.C.S., 7, Comiston Road, Edinburgh.
Makepeace, A. B., 11, Kirkdale, Sydenham, S.E.
Mallinson, Geo. A., 112, Wilmslow Road, Withington, Manchester.
Mander, A., F.C.S., Belle Vue Pharmacy, Malvern.
Mann, Ernest W., 17, Bull Street, Birmingham.
Mann, Sydney A., Pathological Laboratory, Claybury Asylum, Woodford Bridge, Essex.
Marchant, D., Star Road, Old Eastbourne.
Marris, T., 83, Bridge Street, Worksop, Notts.
Marsden, E. G. L., 221, Chester Road, Manchester.
Marsden, Prosper H., F.C.S., The University, Liverpool.
Marshall, A. E., 59, Broad Street, Worcester.
Marshall, Henry H., 128, Alcester Road, Moseley, Birmingham.
Martin, N. H., J.P., F.R.S.E., F.L.S., F.C.S., Ravenswood, Low Fell, Gateshead-on-Tyne.
Martindale, W. H., Ph.D., 10, New Cavendish Street, W.
Mason, T., c/o Messrs. Newball & Mason, Nottingham.
Mather, J. H., J.P., Godalming.
Matthews, Harold E., 30, The Mall, Clifton, Bristol.

Matthews, H. R., 61, Charlotte St., Tottenham Court Road, W.
Matthews, J. G., 156, Church Road, Hove, Sussex.
Matthews, T., Man of Ross House, Ross, Herefordshire.
Matthews, Wm., 67, Holborn Viaduct, E.C.
Mawer, W. F., F.C.S., 332, Kennington Road, S.E.
Mayger, W. D., 6, Regent Square, Northampton.
Meldrum, Martin, 150, High Street, Irvine.
Mellor, R. J., Hemel Hempstead.
Mercer, F. N., 101, Mostyn Street, Llandudno.
Merry, E. Lee, 136, Southgate, Gloucester.
Merson, Geo. F., F.C.S., 7, King Street, Kilmarnock.
Metcalfe, C. L., 13, Whitefriargate, Hull.
Middleton, A., 25, Lister Gate, Nottingham.
Miles, C. J., 165, Edgware Road, W.
Millard, E. J., F.C.S., F.R.M.S., 35-42, Charlotte Street, E.C.
Miller, John, 4, Victoria Road, Brighton.
Miller, Thomas, 5, Yarburgh Street, Whalley Range, Manchester.
Milne, Alexander, 61, Tything, Worcester.
Milton, T. C., 265, High Street, Exeter.
Minchin, W., 15, Westgate Street, Gloucester.
Moffitt, T. N., 209, Crumlin Road, Belfast.
Montgomery, Johnston, 147, Royal Avenue, Belfast.
Moor, C. G., M.A., F.I.C., Savoy House, Strand, W.C.
Moore, J. E. Langford, St. Bartholomew's Hospital, E.C.
Morley, C., 3, Bucklersbury, E.C.
Morris, G., Union Street, Wednesbury.
Morrison, Charles Orr, 137, West Street, Sheffield.
Morson, Albert, 14, Elm Street, Gray's Inn Road, W.C.
Morson, Thomas D., 14, Elm Street, Gray's Inn Road, W.C.
Morson, T. Pierre, 14, Elm Street, Gray's Inn Road, W.C.
Moylan-Jones, W. J., 45, Newhall Street, Birmingham.
Murray, Richard, c/o Messrs. Brotherton & Co., Ltd., Holmes Street, Dewsbury Road, Leeds.
Muston, G. G., 57, Western Road, Brighton.
Muter, A. H. M., F.I.C., F.C.S., 325, Kennington Road, S.E.

Naylor, W. A. H., F.I.C., F.C.S., 38 & 40, Southwark Street, S.E.
Naysmith, A., 154, High Street, Arbroath.
Nesbit, J., 162, High Street, Portobello, N.B.
Nesbit, James, 32, Wellington Street, Portobello, N.B.
Newlyn, James, Wellswood Pharmacy, Torquay.
Newsholme, G. T. W., J.P., F.C.S., 27, High St., Sheffield.
Nicholl, I. W., M.P.S.I., 25, High Street, Belfast.
Nicholls, Wm. W. S., B.Sc., F.C.S., 230, Brockley Road, S.E.
Nidd, J. H., 714, Rochdale Road, Manchester.
Noble, J., 55, King Street, South Shields.
Norman, Valentine, High Street, Godalming.
Nuthall, E., Bank Plain, Norwich.

Odling, Prof. W., M.B., F.R.S., etc., 15, Norham Gardens, Oxford.
Ogden, Alfred, 15, Wycliffe Road, Urmston, near Manchester.
Oldfield, Ashley C., New Bridge Street, Manchester.
Oliver, Arthur, 56, Wintringham Road, Grimsby.
Ord, S. W., 3, Hanover Street, Hanover Square, W.
Orrell, W. P., 82, Castle Street, Edgeley, Stockport.
Ottey, Thomas, 70, Derby Street, Burton-on-Trent.
Ough, Lewis, F.L.S., F.C.S., "Fernleigh," St. James' Rd., Leicester.
Overton, Percy S., 50a, Lord Street, Liverpool.
Oxen D. H., 40, Bridge Street, Newcastle-under-Lyne.

Pack, F. J., The Avenue, Hitchin.
Paine, Standen, Devisdale, Bowdon, Cheshire.
Palmer, F. J., 12, Montpellier Avenue, Cheltenham.
Park, C. J., 23, Mutley Plain, Plymouth.
Parker, R. H., F.C.S., "Ravenscar," Orchard Road, Blackheath, S.E.
Parkes, G. J. R., Ferndale, 109, Musters Road, West Bridgford, Nottingham.
Parkinson, F. W., Atherstone, Warwickshire.
Parry, E. J., B.Sc., F.I.C., F.C.S., 208, Borough High Street, S.E.
Parsons, Wm., 54, Coper's Copse Road, Beckenham.
Partington, J. J., 2, Beaufort West, Grosvenor, Bath.
Pater, J. B., Broomhill, Sheffield.
Paterson, A. G. C.. c/o Hopkin & Williams, Lavender Mount, Ilford.
Patey, W. J., 76, New Bond Street, W.
Patterson, George Rae, Seaton Hirst, Northumberland.
Payne, J. C. C., J.P., Albion Place, 134, Dublin Road, Belfast.
Pearce, J. H., 252, Chorley Old Road, Bolton.
Pearson, G. E., Snow Hill Buildings, E.C.
Peck, E. Saville, M.A., 30, Trumpington Street, Cambridge.
Peck, J. Wicliffe, Hospital for Sick Children, Gt. Ormond Street, W.C.
Peck, T. Whitmore, Osborne House, Stechford, Birmingham.
Pedley, G., 17, Railway Approach, London Bridge, S.E.
Pennington, John, 25, Standishgate, Wigan.
Perkins, J., 29, Victoria Street, Wolverhampton (Exors. of the late).
Perrédès, P. E. F., B.Sc., Wellcome Research Laboratories, 6, King Street, Snow Hill, E.C.
Perry, Sir Cooper, M.D., Superintendent's House, Guy's Hospital, S.E.
Perry, G. E., F.C.S., 171, Hagley Road, Birmingham.
Pettinger, E., 30, Rosslyn Hill, Hampstead, N.W.
Petty, W. J., 93, Wood Vale, Forest Hill, S.E.
Phillips, J. J., Ryecroft, Ashton-under-Lyne.
Phillips, A. J., 156, Cromwell Road, South Kensington, S.W.
Phillips, H. S., 48, Wallgate, Wigan.
Phillips, J., 48, Wallgate, Wigan.
Phillips, Sidney, 8, Lichfield Street, Wolverhampton.
Philp, W. J. Ignatius, 34, High Street, Notting Hill, W.
Pidd, A. J., Brookfield, Upper Chorlton Road, Manchester.
Piddock, John H., 341, Bearwood Road, Smethwick, Birmingham.
Pinchbeck, Gerald, F.C.S., 51, Holland Street, Pendleton. Manchester.
Pitman, J., 42, Redcliff Hill, Bristol.
Pitt, Arthur E., F.C.S., 66, Abbott Road, Bromley, London, E.
Pitt, Chas. Day, 101, Church Street, Brighton.
Place, Edward B., 417, Moseley Road, Birmingham.
Platts, John, 19, Lower Priory, Birmingham.
Plumley, J. G., Bristol Bridge, Bristol.
Pollard, Evelyn Wm., B.Sc., Lond., 168, High Street, Ryde, I.W.
Pollard, Henry H., 168, High Street, Ryde, I.W.
Poole, James, 47, High Street, Newcastle, Staffs.
Poole, Jeffrey, 13, Great Hampton Street, Birmingham.
Potter, H., F.S.S., 62 & 64, Artillery Lane, E.
Power, Dr. F. B., 6, King Street, Snow Hill, E.C.
Prebble, J. G. (Messrs. Wing, Aplin & Co.), Chislehurst.
Presley, E., 12, St. Augustine's Parade, Bristol.
Preston, Job, 105, Barker's Pool, Sheffield.

Preston, J. C., 81, Bishopsgate Street Without, E.C.
Preston, Thos. I., Oakwood Pharmacy, Roundhay, Leeds.
Price, W., 30, Grove Road, Eastbourne.
Probyn, Col. Clifford, 55, Grosvenor Street, Grosvenor Square, W.
Procter, Henry Raithby, 113, The Grove, Hammersmith, W.
Prosser, F. H., 112, Spring Hill, Birmingham.

Quant, Ernest, 2, Park Crescent, Torquay.
Quarrell, Wm. Henry, M.A., 3, East India Avenue, E.C.

Radcliffe, L. G., School of Technology, Manchester.
Radford, J. A., 14, Union Street, Birmingham.
Ranken, C., F.C.S., F.R.M.S., 19, Stockton Road, Sunderland.
Rankin, W. J., 11, Waring Street, Belfast.
Ransom, F., F.C.S., The Chilterns, Hitchin.
Ransom, W., F.L.S., F.S.A., Fairfield, Hitchin.
Ratcliffe, Samuel, 659, Lord Street, Southport.
Rayner, Edith, 31, Woodberry Grove, Finsbury Park, N.
Reavley, R., 7, Clervaux Terrace, Jarrow-on-Tyne.
Redford, G. A., 30, Oxford Street, Liverpool.
Rees, R. P., M.R P.S., 177, High Street, Dowlais.
Reeves, Robt., 13, Gt. Hampton Street, Birmingham.
Reid, Wm., 100, Holburn Street, Aberdeen.
Remington, J. S., F.C.S., The Laboratory, "Aynsome," Grange-over-Sands.
Reynolds, R.F., 13, Briggate, Leeds.
Reynolds, R. J., J.P., 38 & 40, Southwark Street, S.E.
Richards, F. J., General Dispensary, Burbury St., Lozells, Birmingham.
Richards, P. A. E., F.I.C., F.C.S., Charing Cross Hospital, W.C.
Richardson, H. N. B., B.A., F.C.S., c/o Messrs. John Richardson & Co., 10, Friar Lane, Leicester.
Richardson, Percy G., F.C.S., 222, Market Place, Dudley.
Richardson, R. T., 129, Ullet Road, Liverpool.
Rideal, S., D.Sc., F.I.C., F.C.S., F.G.S., 28, Victoria Street, Westminster, S.W.
Righton, J., 515, Lord Street, Southport.
Ringer, F. A., 23, St. Ann's Square, Manchester.
Roberts, Haworth, Barlow Fold, Romiley, Stockport.
Roberts, R., 13, Church Street, Camberwell, S.E.
Roberts, S., 9 & 11, Clerkenwell Road, E.C.
Roberts, Walter, The Infirmary, Stockport.
Robertson, Dr. A. M. 483, Argyle Street, Glasgow.
Robertson, D. S., 170, Main Street, Rutherglen, N.B.; and 70, Caledonia Road, Glasgow.
Robertson, George, Partick, Glasgow.
Robertson, John, 19, West Port, Arbroath, N.B.
Robertson, Dr. J. McGregor, M.A., M.B., etc., 26, Buckingham Terrace, Great Western Road, Glasgow.
Robinson, C. E., 4, Victoria Terrace, Hove.
Robinson, F., 14A, Bradshaw Street, Moss Side, Manchester.
Robinson, R. A., J.P., 195, Brompton Road, S.W.
Robinson, R. A., junr., 17, Bloomsbury Square, W.
Robinson, Sir T. W., J.P., 112, Upper George's Street, Kingstown, Dublin.
Robinson, W. P., 17, Pavement, Clapham Common, S.W.
Rodman, J. and R., 285, Duke Street, Glasgow.
Rodwell, Henry, St. Thomas' Hospital, S.E.
Rogers, Frank A., 327, Oxford Street, W.
Rogerson, W. J., 38 & 40, Southwark Street, S.E

Roper, H. O., 29, Mosley Street, Newcastle-on-Tyne.
Ross, Andrew L., 21, High Street, Montrose.
Rossiter, F., 9, Grand Parade, St. Leonards-on-Sea.
Rowland, George Howard Charles, 115, Prince's Street, Edinburgh.
Royce, S., School of Pharmacy, 13, Victoria Street, Nottingham.
Russell, A. H., 318, Moseley Road, Birmingham.
Russell, James (of D. Russell & Son), 111, Nethergate, Dundee.
Rutherford, R. J., Front Street, Newbiggin-by-Sea.

Sage, C. E., F.C.S., 160–162, Kennington Park Road, S.E.
Sainsbury, S., 136, Regent Street, W.
Sambrook, John T., High Street, Barnet.
Sangster, A., 141, Finchley Road, South Hampstead, N.W.
Sargeant, F. Pilkington, F.C.S., Leeds College of Pharmacy, Leeds.
Sarson, Fred, "Ryecroft," Paignton, Devon.
Saul, J. E., F.I.C., Black Warren, Radlett, Herts.
Saunders, W. H., 34, Hanover Street, Liverpool.
Savage, F. C., 13, Briggate, Leeds.
Savage, W. W., 109, St. James's Street, Brighton.
Savory, A. L., 143, New Bond Street, W.
Saxby, Austin, C., 397, High Street, Cheltenham.
Sayer, E. C., 7, Warrington Road, Ipswich.
Schlesinger, H. A., 11, Warren Road, Chingford, Essex.
Schollar, N. Howard, 29, Sussex Place, Queen's Gate, S. Kensington.
Scholes, W.I., 130, Church St., Eccles.
Scott-Smith G. E., 27, High Street, Sheffield.
Scott, Walter C., 316, Wheeler Street, Lozells, Birmingham.
Scruton, Saml. (Messrs. Raimes & Co.), Micklegate House, York.
Self, P. A., B.Sc., 41, Wiverton Road, Sydenham, S.E.
Selleck, W. R., 136, High Street, Stourbridge.
Selley, J., 142, Earl's Court Road, South Kensington, S.W.
Senior, J., 2, Compton Street, Eastbourne.
Seyler, Clarence A., B.Sc., F.I.C., The Technical Institute, Nelson Terrace, Swansea.
Seymour, F. S., The Square, Wimborne.
Shacklady, J., F.C.I.S., 24A, St. James' Road, Liverpool.
Shackleton, G. W., Abergavenny.
Shacklock, J. H., 239, Streatham High Road, S.W.
Sharland, C., Eldon House, Eldon Street, E.C.
Sharp, Gordon, M.D., 3, St. George's Terrace, Camp Road, Leeds.
Sharrah, Richard, 38 and 40, Southwark Street, S.E.
Shaw, A., Riddings, Derbyshire.
Shaw, J. W., 4, Edwardes Terrace, Kensington Road, W.
Shaw, W. A., 147, High Street, Harborne, Birmingham.
Shelly, J., Wellington Road, Bilston.
Shepheard, W. F. J., F.C.S., 12, Bridge Street Row, Chester.
Shepherd, J. W., Settle, Yorks.
Shorthouse, Herbert S., F.C.S., 144, Edmund Street, Birmingham.
Shuttlewood, W. B., F.C.S., c/o A. S. Watson & Co., 64, Crutched Friars, E.C.
Silson, R. W., 113, Church Street, Manningham, Bradford, Yorks.
Silverlock, H., 92, Blackfriars Road, S.E.
Simons, William, Royal Devon and Exeter Hospital, Exeter.
Simpson, Allwood, 9, Melbourne Street, Stalybridge.
Skyrme, Chas. Geo., 28, Norman Road, St. Leonard's-on-Sea.
Smallwood, F. W., 111, Grove Lane, Handsworth, Birmingham.
Smiles, J., Blanchfield Chemical Works, Canonmills, Edinburgh.
Smiley, John A. R., 109, Eccles Old Road, Pendleton, Manchester.

Smith, Allen, 41, School Road, Sale.
Smith, Arthur R., Owens College, Manchester.
Smith, A. W., Pershore.
Smith, F. A., 35, Colmore Row, Birmingham.
Smith, Fredk., 221, Soho Road, Handsworth, Birmingham.
Smith, John, 3, Terenure Road, Dublin.
Smith, J. Collett, 36, Birkbeck Road, Acton, London, W.
Smith, J. H., 227, Commercial Road East, E.
Smith, J. L., 180, High Street, Pendleton, Manchester.
Smith, M., 54, Oxford Street, Kidderminster.
Smith, Tenison, Top of Union Street, Ryde, Isle of Wight.
Smithson, John, 1, Preston Road, Brighton.
Solomon, Albert H., 75, Holland Road, Kensington, W.
Southall, A., F.C.S., Carrick House, Richmond Hill, Edgbaston, Birmingham.
Southall, A. Wm., Lower Priory, Birmingham.
Southall, Gilbert, 18, York Road, Edgbaston, Birmingham.
Southall, Wilfred F., 17, Bull Street, Birmingham.
Spence, Alexander, 133, High Street, Linlithgow.
Squire, G., 19, Haymarket, Sheffield.
Squire, P. W., F.L.S., F.C.S., 413, Oxford Street, W.
Stacey, H. G., F.L.S., F.C.S., 300, High Holborn, W.C.
Stainer, J. W., F.C.S., 59, Sandgate Road, Folkestone.
Stamp, E. B., 29, High Street, Hampstead, N.W.
Stamp, F. U., 29, High Street, Hampstead, N.W.
Stanway, E., 10, Horseley Fields, Wolverhampton.
Starkie, R. S., 126, Strand, W.C.
Stevens, P. A., 72, Mansfield Road, Gospel Oak, N.W.
Stevenson, H. Edward, F.C.S., 155, Coventry Road, Ilford.
Stevenson, H. Ernest, F.C.S., 4, Jewry Street, E.C.
Stevenson, Sir Thos., M.D., F.I.C., F.C.S., 382, Streatham High Road, S.W.
Steward, C. A., High Street, Worcester.
Steward, Alderman J. A., J.P., Fort Royal, Worcester.
Stewart, A. K., 1, Lynedoch Place, Edinburgh.
Stickland, W. H., 23, Cromwell Place, South Kensington, S.W.
Stiles, M. H., F.R.M.S., 10, Avenue Road, Doncaster.
Stockman, Prof. R., M.D., F.R.C.P.E., The University, Glasgow.
Stones, Lionel, c/o Jewsbury & Brown, Ardwick Green, Manchester.
Stones, W., 7, Ardwick Green North, Manchester.
Storey, E. H., 42, Castle Street East, Oxford Street, W.
Storrar, D., 228, High Street, Kirkcaldy, N.B
Stout, Harry, 57, Broad Street, Pendleton, Manchester.
Strongitharm, W. G., 112, Upper George's Street, Kingstown, Co. Dublin.
Stuart, C. E., B.Sc., 29, Mosley Street, Newcastle-on-Tyne.
Stubbs, E., Acocks Green, Birmingham.
Sturton, J. G., 42, Bridge Street, Peterborough.
Sturton, R., 6, Park Terrace, Cambridge.
Suddaby, J. E. S., 344, Hessle Road, Hull.
Sutherland, J. W., 127, Buchanan Street, Glasgow.
Sutton, F., F.I.C., F.C.S., Norfolk and Suffolk County Laboratories, Norwich.
Swanson, A. J. R., 59, St. John's, Worcester.
Swinglehurst, J., Holmleigh, Higher Bentcliffe, Pendleton, Manchester
Swinn, Charles, 125, Upper Moss Lane, Manchester.
Swinton, Thos. Henry, 16, Irlam Road, Bootle, Liverpool.
Symes, C., Ph.D., F.C.S., 14, Hardman Street, Liverpool.

Tankard, A. R., 11, All Saints' Road, King's Heath, Birmingham.
Tanner, A. E., F.C.S., Westminster Hospital, S.W.
Taylor, A. L., The Dispensary, Royal Infirmary, Bristol.
Taylor, C. Sansom, 224, Evering Road, Upper Clapton, N.E.
Taylor, F. W., 36, High Street, Newport Pagnell.
Tayor, G. H., 2, Worcester Street, Kidderminster.
Taylor, John, J.P., F.L.S., F.C.S., 15, Lucius Street, Torquay.
Taylor, Samuel, 3, Market Place, Derby.
Thomas, J. Arden, College Pharmacy, Bath Road, Cheltenham.
Thompson, C., 159, Stratford Road, Sparkbrook, Birmingham.
Thompson, Edwin (Messrs. Thompson & Capper), 4, Lord Street, Liverpool.
Thompson, E. J., Alum Rock Road, Saltley, Birmingham.
Thompson, H. A., 40, Aldersgate Street, E.C.
Thomson, John H., 102, High Street, Lochee, Dundee.
Thomson, W., F.I.C., F.R.S.E., Royal Institution Laboratory, Manchester.
Thomson, W., 153, Byres Road, Glasgow.
Thornton, C. H., Beacon Hill, Exmouth.
Thorp, E. F. W., 96, Princess Road, Moss Side, Manchester.
Thorpe, Joseph, 61, Lionel Street, Birmingham.
Thorp, Walter, B.Sc. (Lond.), F.I.C., Analytical Laboratory, Limerick.
Thresh, John C., M.D., D.Sc., D.P.H., Chelmsford, Essex.
Tickle, T., B.Sc., Public Analyst's Laboratory, 83, Queen Street, Exeter.
Tirrell, J., Market Square, Hanley.
Tocher, J. F., F.I.C., F.C.S., 7, Chapel Street, Peterhead, N.B.
Tocher, Robt., F.S.M C., D.B.O.A., 491, Victoria Row, Glasgow.
Tollitt, W., 111, Montague Street, Worthing
Tomlinson, G. M., Royal Hospital, Sheffield.
Tompsett, Leighton S., 127, Anerley Road, London, S.E.
Toone, Arthur H., 17, Rolle Street, Exmouth.
Toone, J. A., 50, Old Christchurch Road, Bournemouth.
Towers, W. L., 10, Railway Street, Chatham.
Townsend, Chas., J.P., St. Mary's, Stoke Bishop, Bristol.
Tranmer, H. M., 78, High Street, Smethwick, Birmingham.
Truman, Frank W., 71, Old Kent Road, S E.
Truman, H. Vernon, Market Square, Wickham, Hants.
Turner, C. W., 12, Foregate, Worcester.
Turner, G. T., "Lynne," Osborne Road, Clifton, Bristol.
Turner, J. Scriven, 20, Bury Street, Great Russell Street, W.C.
Turner, J. W. J., 20, Market Street, Eckington, Derbyshire.
Turney, J. Davy, 15, Leigham Terrace, Plymouth.
Turver, C. H., 40, Market Street, Blackpool.
Tweedy, S. C. G., St. Bartholomew's Hospital, London, E.C.
Twinberrow, John, Elbury House, Elbury, Worcester.
Twining, Thos. C., 21, Cross Road, Chorlton-cum-Hardy, near Manchester.
Twiss, W., Hunstanton, Norfolk.
Twivey, A., 151, Broad Street, Birmingham.
Tyrer, Chas. T., Stirling Chemical Works, Abbey Lane, Stratford, E.
Tyrer, Thos., F.I.C., F.C.S., Stirling Chemical Works, Abbey Lane, Stratford, E.
Tyson, J., 16, Mayfield Road, Whalley Range, Manchester.

Umney, C., F.I.C., F.C.S., 48 & 50, Southwark Street, S.E.
Umney, E. A., 48 & 50, Southwark Street, S.E.

Umney, John C., F.C.S., 48 & 50, Southwark Street, S.E.
Unsworth, John W., 113, George Street, Altrincham.

Vallance, A. C., Rowley Bank, Ecclesmere Park, Eccles.
Vance, Clement B., Ph.C., The Burnaby Pharmacy, Greystones, Ireland.
Vinden, Fredk. W., Mount Radford, Exeter.
Voce, W. G., 52, Halesowen Road, Netherton, near Dudley.
Vogt, Geo., 30, Highgate, Kendal.

Wain, Charles Oliver, 8, Church Street, Haslingden.
Wakefield, Thos., Brookfields, Birmingham.
Wakeham, C., Helston, Cornwall.
Walker, John, 32, Virginia Street, Glasgow.
Walker, William, Downfield, by Dundee.
Wallis, T. E., B.Sc. Lond., A.I.C., F.C.S., Technical Institute, 96, Stephens Road, Tunbridge Wells.
Walmsley, S. E., 8, Surbiton Park Terrace, Kingston-on-Thames.
Walsh, Dr. J. A., 30, Westmoreland Street, Dublin.
Walton, J. Woodruff, 427, Bury New Road, Manchester.
Want, W. Phillip, 44, Bishopsgate Street Without, E.C.
Ward, G., F.I.C., F.C.S., Millgarth Mills, Leeds.
Ward, J., 39, Eastgate Street, Gloucester.
Ward, T. Armistead, F.C.S., 15, Exchange Street, Blackburn.
Warner, C. Home, 17, Bloomsbury Square, W.C.
Warren, W., 24, Russell Street, Covent Garden, W.C.
Warrick, F. W., 6, Nile Street, City Road, E.C.
Watkinson, H. A., 43, Higher Market Street, Farnworth, R.S.O.
Watson, David, 41, Sinclair Drive, Langside, Glasgow.
Watson, David M., 61, South Gt. George's Street, Dublin.
Watson, F. P., F.C.S., 6, Bailgate, Lincoln.
Watson, J. E. H., Rose Corner, Norwich.
Watts, Wm., 5, James Street, Crieff.
Weaver, A. C., 42, Dudley Road, Wolverhampton.
Webb, E. A., 60, Bartholomew Close, E.C.
Webb, E. F., Sun Street, Hitchin.
Webb, John H., Market Place, Luton.
Weddell, George, 20, West Grainger Street, Newcastle-on-Tyne.
Weld, C. Corning, Snow Hill Buildings, Holborn Viaduct, E.C.
Wellcome, H. S., Snow Hill Buildings, Holborn Viaduct, E.C.
Wells, W. F., Ph.C., 20, Upper Baggot Street, Dublin.
Welton, Chas. H., 13, High Street, Coventry.
Weston, S. J., 151, Westbourne Terrace, W.
Whatmough, Wilfred A., A.I.C., 8, Brandon Terrace, Edinburgh.
Whigham, R. L., 22, Brook Street, Bond Street, W.
White, Arthur F., 59, and 61, Sunbridge Road, Bradford, Yorks.
White, Chas. Stewart, 40, Buckingham Palace Road, S.W.
White, Edmund, B.Sc., F.I.C., 16, Cross Street, Hatton Garden, E.C.
White, Jas. W., F.L.S., Warnham, 18, Woodland Road, Clifton, Bristol.
White, Thomas, 8, Prince of Wales Terrace, Bray, Co. Wicklow.
White, Thos. A., Elm Grove, Southsea.
White, W. Carter, F.C.S., "Glenholme," Sidcup, Kent.
Whitehouse, E. B., 35, Bearwood Road, Smethwick, Birmingham.
Whitfield, J., F.C.S., 113, Westborough, Scarborough.
Whittle, Jas., F.C.S., 30, Bridge Street, Morpeth.

Whyte, J. S., 57, Guthrie Port, Arbroath, N.B.
Wiggins, H., 236, Southwark Park Road, S.E.
Wigginton, A., 137, Sloane Street, S W.
Wild, John, 307, Oxford Street, Manchester.
Wild, Sydney, 76, Mill Street, Macclesfield.
Wilkinson, B. J., 7, Middleton Road, Kingsland, N.E.
Willcock, F. A., 71, Victoria Street, Wolverhampton.
Willan, R., 5, Market Street, Ulverston.
Willdey, W. T., 48, Church Street, Birmingham.
Williams, G. A., 131, Embden Street, Manchester.
Williams, Jesse, 132, Queen Street, Cardiff.
Williams, H. G., 7, Montgomery Road, Sheffield.
Williams, T. R., Norton House, St. John's Road, Penge, S.E.
Williams, W. G., Old Colwyn, Conway Bay.
Williamson, F. A., Moor Park Pharmacy, Garstang Road, Preston, Lancs.
Williamson, J , 55, Western Road, Hove, Sussex.
Williamson, W. H., "Clovelly" Hawthorn Lane, Wilmslow, Manchester.
Wills, G. S. V., Westminster College, Trinity Square, Boro', S.E.
Wilson, J., 11, George Street, Bath.
Wilson, J. H., J.P., C.C , The Knowle, Harrogate.
Wilson, Wm. Potter, 36, High Street, Haddington, N.B.
Wing, G. N., 29, Market Place, Melton Mowbray.
Wokes, T S., Grassendale, near Liverpool.
Wolstenholme, William, Woodhouse, Nr. Sheffield.
Wood, A., New Brentford, Middlesex.
Woodcock, B. J., 1, Montague Road, Birmingham.
Woodhead, S. A., B.Sc., F.I.C., F.C.S., The College, Uckfield, Sussex.
Woodruff, Thos., 43, Lapwing Lane, Withington, Manchester.
Woodruff, Walter, 46, Station Road, Cheadle Hulme, Stockport.
Woods, W. H., 50, Bedford Street, Plymouth.
Woodward, H. K., 7, Bull Green, Halifax.
Woolcock, W. J. Uglow, University College Hospital, Gower St., W.C.
Woollcombe, Dr. Robert Lloyd, M.A., LL.D. (Dublin Univ.), Barrister-at-Law, 14, Waterloo Road, Dublin.
Woolley, E. J., Victoria Bridge, Manchester.
Woolley, G. S., Victoria Bridge, Manchester.
Woolley, Hermann, Victoria Bridge, Manchester.
Woolley, Percy, Victoria Bridge, Manchester.
Woolley, S. W., 91, Southwood Lane, Highgate, N.
Woollons, C. H. F., 28, Kilburn Lane, W.
Wootton, H., B.Sc., London College of Pharmacy, 323, Clapham Road, S.W.
Worfolk, G. W., 18, Brook Street, Ilkley.
Wrenn, W. A., F.C.S., 15, East Street, Taunton.
Wright, A., A.K.C., 12, Yerbury Road, Upper Holloway, N.
Wright, G., 102, High Street, Burton-on-Trent.
Wright, H. C., 48 & 50, Southwark Street, S.E.
Wright, R., F.C.S., 11, Eagle Parade, Buxton, Derbyshire.
Wyatt, Harold, 223, Stanley Road, Bootle, Liverpool.
Wyatt, William, c/o Messrs. Jas. Woolley, Sons & Co., Victoria Bridge, Manchester.
Wyborn, J. M., F.C.S., 59, Moorgate Street, E.C.
Wyley, W. F., Wheatley Street, Coventry.
Wyman, J. S., 58, Bunhill Row, E.C.
Wynne, E. P., 7, Pier Street, Aberystwith.
Yates, C. G., 9, Upper Hamilton Road, Brighton.

Yates, D., 32, Darwen Street, Blackburn.
Young, J. Rymer, F.C.S., 40, Sankey Street, Warrington.
Young, R. F., Lindum House, New Barnet.

NOTICE.

Members are requested to report any inaccuracies in these lists by letter, addressed as follows:—

THE ASST. SECRETARY,
BRIT. PHARM. CONFERENCE,
17, *Bloomsbury Square,*
London, W.C.

PROGRAMME OF THE PROCEEDINGS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FORTY-FOURTH ANNUAL MEETING, MANCHESTER, 1907.

OFFICERS.

President—THOS TYRER F I C, F C S, London

Vice Presidents.

(*Who have filled the office of President*)

JOHN ATTFIELD, Ph D, F R S, F I C, F C S, Watford
S R ATKINS J P, Salisbury
CHAS UMNEY, F I C, F C S, London
N H MARTIN, F.R S E, F L S, Newcastle-on Tyne
C SYMES, Ph D, Ph C, F C S, Liverpool
J C C PAYNE, J P, M P S I, Belfast
E M HOLMES, F L S, Ph C London
G C DRUCE, M A, F L S, Oxford
T. H W. IDRIS, L C C, J P, F C S, London.
W A H NAYLOR F I C, F C S, London.

Vice Presidents.

R. A. ROBINSON, L C C, J P, London
D B DOTT, F R S E, F.I C, Edinburgh
J. A WALSH, Dublin
G S WOOLLEY, Manchester
F RANSOM, F C S, Hitchin
HENRY G GREENISH, F L S, F I C, London

Honorary Treasurer.—JOHN C UMNEY, F C S, London

Honorary General Secretaries.

E. SAVILLE PECK, M A, Cambridge | EDMUND WHITE, B Sc, F I C, London

Honorary Local Secretary. W. KIRKBY.

Assistant Secretary. JOHN HEARN

Other Members of the Executive Committee.

H Alcock, Birmingham
H Finnemore, London
H W. Gadd, Exeter
A W. Gerrard, Birmingham
D Lloyd Howard London
W H Martindale, Ph D, London
C Thompson, Birmingham
J F Tocher, Peterhead
R Wright, F C S, Buxton

Auditors.

J W BOWEN, London, and W P. ROBINSON, London

Editor of the Year Book. J O BRAITHWAITE

Manchester Local Committee.

Arnfield J C
Avison J
Bagshaw H
Balmforth A
Bamforth J
Bardsley J
Barlow A H
Bates F W
Beard J H
Bell J
Blackburn A
Blain A L
Blain W
Blayney J J
Blayney W H
Blore M
Blyton T B
Booth Dr W G
Botham W
Breadner C G
Breese J S
Brooks J
Broughton T
Brown C
Bullock A H
Burch L N
Burgess A H
Cannon E
Cave J R
Clarke Goddard M P
Clayton G
Clegg J C
Clifworth J
Cooling W J
Crompton H
Cussons J W
Dalrymple T
Darling W H, F I C F C S
Davison J I
Dickson D
Dorran J W
Downes W F
Duncan A W F C S
Eastwood T F
Edwards R G
Evans F E
Fish W
Flint F B
Forbes R T
Foster R Le Neve J P F C S
Franklin J H
Garnett Henry F C S
Garnett J B
Gibson R J P
Gill S
Grier J
Harlin J
Hare C
Harland R F
Heath —
Hershberg A
Hewitt S
Highley W
Hoseason J H
Hough R
Hughes, W Griffiths
Innes D
Jackson G
Jackson U A Ph D
Jeans A
Jeans E
Jeans T
Johnstone C A
Johnstone E S
Kay T J P
Kemp H
Kerfoot E H
Kerfoot T
Kidd J C
Kirkby W
Knott P
Lane W
Lees J
Lewis D
Layland J
McDougall I
Mallinson G A
Marsden F C L
Merry E Lee
Middleton C
Miller T
Napier A
Nidd J H
Nottber Dr
Ogden A
Oldfield A C
Oldfield E
Paine S
Pattinson T P
Phillips J J P
Pidd A J
Pratt G W
Radcliffe L C F C S
Reynolds R J J P
Righton J
Ringer F A
Roberts H
Robertson A H
Robinson F
Rose J
Simpson A
Skirrow F J
Slack J L
Smiley J A R
Smith Allen
Smith J L
Stones I
Stones W
Stout H
Sumner J
Swinburne T R
Swinn C
Taylor H
Terry F W
Thompson F
Thomson W F I C F R S E
Thorpe E F W
Tildesley R W
Travis H A
Turner C F C S
Twining T C
Tyson J
Vallance A C
Walton J W
Ward T Armistead F C S
West H T
Westmacott G H
Westmacott G L
Whittaker J W
Wild J
Wilkinson J F J P
Williams G A
Williamson W H
Wilson J J
Woodruff H
Woodruff T
Woodruff W
Woolley E J
Woolley G S
Woolley H
Woolley, P
Wright R F C S
Wyatt W
Young J R F C S

The Sittings of the Conference were held in

MIDLAND HALL, MIDLAND HOTEL, MANCHESTER,

On TUESDAY and WEDNESDAY, JULY 23 and 24, 1907.

TUESDAY, JULY 23.

The CONFERENCE met at 9.30 a.m., adjourning at 2 p.m.

Order of Business.

Addresses of Welcome.
President's Address.
Report of Executive Committee.
Financial Statement.
Report of Treasurer of the "Bell and Hills" Library Fund.
Reading of Papers, and Discussions thereon.

PAPERS.

1. *Note on the Chloroforms of Aconite and Belladonna,* by R. WRIGHT, F.C.S.
2. *What is Oil of Juniper?* by JOHN C. UMNEY, F.C.S., and C. T. BENNETT, B.Sc.
3. *Note on Juniper Oil,* by F. C. J. BIRD.
4. *Examination of Chromic Anhydride and its Solutions,* by T. E. WALLIS, B.Sc., F.I.C.
5. *Pharmacy Notes from various parts of the World,* by W. H. MARTINDALE, Ph.D.
6. *The Preservation of certain Laboratory Solutions,* by F. H. ALCOCK.
7. *Determination of the Amount of Alkalies in the Ash of Drugs,* by F. H. ALCOCK.
8. *On Cucumis trigonus (Roxb.) and Colocynthin,* by W. A. H. NAYLOR, F.I.C., and E. J. CHAPPEL.

WEDNESDAY, JULY 24.

The CONFERENCE met at 9.30 a.m., adjourning at 2 p.m.

Order of Business.

Reception of Delegates.
Reading of Papers, and Discussions thereon.

PAPERS.

9. *Artificial Calamines,* by Prof. R. B. WILD.
10. *Immunity to Disease among Plants,* by PROF. WEISS.
11. *The Bacteriology of Plasters and Protective Tissues,* by G. PINCHBECK

12. *Note on the Decolourizing Action of Animal Charcoal*, by PROF. ED. KNECHT.
13. *An Improved Form of Liquid Extract of Cascara Sagrada*, by J. H. FRANKLIN.
14. *A New Method of preparing Saccharated Carbonate of Iron and its Suggested Use in Pharmacy*, by J. H. FRANKLIN.
15. *The Pungent Principle of Ginger—preliminary note*, by HENRY GARNETT, F.C.S., and JAS. GRIER, M.Sc.
16. *The Officinal Testing of Drugs and Chemicals*, by J. P. GILMOUR.
17. *Note on the Keeping Properties of Infusion of Quassia*, by E. QUANT.
18. *The Determination of Ferrous Carbonate*, by PHILIP H. CREWE.
19. *Note on Medicinal Resinoids*, by D. B. DOTT, F.I.C.
20. *Antimonium Sulphuratum*, by D. L. HOWARD and J. B. P. HARRISON, F.I.C.
21. *False Calumba Root*, by S. TAYLOR.
22. *Note on Ext. Fuci Vesiculosi*, by F. C. J. BIRD.
23. *Chemical Examination of the Fruits of Brucea antidysenterica (Lam.)*, by F. B. POWER, Ph.D., and A. H. SALWAY, Ph.D.
24. *Chemical Examination of the Barks of Brucea antidysenterica (Lam.) and B. sumatrana (Roxb.)*, by A. H. SALWAY, Ph.D., and W. THOMAS.

BRITISH PHARMACEUTICAL CONFERENCE

LIST OF VISITORS, MANCHESTER, 1907.

Aberdeen—Giles, Wm. ; Hay, W. F. ; Kay, Jas. P.

Altrincham—Burgess, A. H. and Mrs. ; Downes, W. F. ; Nicholson, Miss L.

Ashton-under-Lyne—Hewitt, Silas and Mrs. ; Kerfoot, T. ; Phillips, J. J.

Assam (India)—Moore, Wm.

Banff—Kidd, J.

Beckenham—Parsons, W.

Belfast—Nicholl, J. W.

Birkenhead—Benger, F. A. Baden and Mrs.

Birmingham—Alcock, F. H. and Mrs. ; Cuxson, J. and Mrs. ; Dallow, C. E. ; Poole, J. and Mrs. ; Smith, F. A. and Mrs. ; Twivey, A.

Blackburn—Gifford, R. L. and Mrs. ; Gifford, Miss.

Bolton—Blain, W. R. ; Knott, Herbert ; Knott, Mrs. E. M. ; Knott, Percy, and Mrs. ; Skirrow, F. J., and Miss.

Bradford—Hanson, A. ; Jackson, J. and Mrs. and Miss ; Silson R. W.

Brighton—Black, H. M. ; Savage, W. W.

Bristol—Boorne, H. E.

Bury—Crompton, H.

Buxton—Wright, R., and Mrs.

Cambridge—Peck, E. S., and Mrs.

Cheltenham—Barron, W. ; Thomas, J. A.

Croydon—Ashton, F. W.

Donegal—Chapman, R. S., and Mrs.

Dowlais—Rees, R. P.

Dublin—Beggs, G. D. ; Kelly, F. ; Kelly, Patrick ; McWalter, Dr. J. C. ; Smith, John ; Walsh, Dr. J. A. ; Wells, W. F., and Mrs. ; Wells, Miss Frances.

Ealing—Allman, J. D.

Eccles—Vallance, A. C., and Mrs.

Edinburgh—Bannerman, R. and Mrs.; Cowie, W. B.; Duncan, W.; Harkness, J.; Hill, J. R.; Lunan, G.; Rowland, G. H., and Mrs.

Exeter—Gadd, H. W.

Farnworth—Watkinson, W. H.

Forfar—Macfarlane, M.

Godalming—Mather, J. H.

Glasgow—Currie, W. L.; Gilmour, J. P. and Mrs.; Sutherland, J W.

Gravesend—Clarke, R. Feaver and Miss.

Haddington—Wilson, W. P.

Hale—Brooks, Jos.; Harland, R. T. and Mrs.

Haslingden—Blaney, W. H.

Helensburgh—McMurray, Jas. and Mrs.

Hitchin—Ransom, F.

Hove—Robinson, C. E.

Ilkley—Worfolk, G. W.

Leeds—Beacock, J. H.; Branson, F. W., and Mrs.; Sargeant, F. P.

Leek—Wardle, Sir Thos.

Leicester—Burford, S. F.

Liverpool—Adcock, J. H.; Cowley, R. C.; Evans, Sir E.; Evans, J. H. E.; Evans, J. N. and Mrs.; Haddock, J.; Shacklady, J.; Symes, Dr. C.; Thompson, Edwin; Wyatt, H.

London—Bennett, R. R.; Bourdas, Miss; Bourdas, I.; Bowen J. W.; Bremridge, R.; Brewis, E. T.; Chalmers, W.; Cofman, J. Drysdale, J. W.; Finnemore, H., and Mrs.; Francis, Alan Gunn, Alex; Hearn, J.; Hills, J. Stuart; Howie, W. L. and Miss Idris, T. H. W.; Maben, Thos.; Makepeace, A. B. and Mrs.; Martindale, Dr. W. H., and Mrs.; Matthews, W.; Naylor, W. A. H.; Pentney, J. C.; Pirie, F. G.; Proctor, H. R.; Robinson, W. P.; Solomon, A. H.; Taylor, C. Sansom; Tyrer, Thos. and Mrs.; Umney, J. C., and Mrs.; Want, W. P., and Mrs.; Weld, C. C.; White, Edmund and Mrs.; Woolley, S. W.

Long Melford—Lenton, W. H., and Mrs.

Macclesfield—Wild, Sydney.

Manchester—Abrahams, G. H. and Mrs.; Allan, John, and Mrs.; Bailey, G. H.; Balmforth, A.; Bates, F. W. and Mrs.; Bayley, Miss A.; Beard, J. H. and Mrs.; Bell, J. and Mrs.; Blackburn, A. E. H., and Mrs.; Blain, A. L. and Mrs.; Blore, M.; Blyton, T. B.; Booth, Dr. W. G.; Boys, F. A.; Breese, J. S. and Mrs.; Brown, C., and Mrs.; Cannon, E.; Clegg,

Mrs.; Clegg, Miss Lillie W.; Clegg, Jos., and Mrs.; Clegg, Miss; Clementi, Miss; Cleworth, J.; Cocker, J. D.; Cooper, G. H.; Dickson, D.; Duncan, A. W.; Edwards, R. G.; Fish, W.; Fishenden, R. B.; Fowler, Dr. G., and Mrs.; Franklin, J. H., and Mrs.; Garnett, H.; Gibson, F.; Gilbert, J. A.; Grier, J.; Hall, Mrs. E.; Hamilton, T. S. and Mrs.; Haworth, H.; Heath, A.; Hershberg, A.; Hope, John and Mrs.; Hoseason, J. H.; Hough, R.; Howard, H.; Hughes, W. Griffiths; Hughes, Miss; Jeans, A. and Mrs.; Jeans, E.; Jeans, T. R., and Mrs.; Johnstone, C. A.; Johnstone, E. S.; Kemp, H., and Mrs.; Kemp, Miss Ethel; Kidd, J. C.; Kirkby, Wm., and Mrs.; Lane, Wm. and Miss; Lester, J. H.; Levi, Caleb; Levinstein, Ivan; Lewis, A. and Mrs.; Little, Miss; Lord, W.; Mallinson, G. A. and Mrs.; Marsden, E. G. L. and Mrs.; Merry, E. Lea; Middleton, C.; Miller, T.; Nidd, J. H.; Nottberg, Dr. P.; Oldfield, H. K.; Pearce, S. L., and Mrs.; Pidd, A. J.; Pidd, Miss; Pidd, Miss M. E.; Pinchbeck, G.; Pratt, G. W. and Mrs.; Pratt, Misses E. and N.; Radcliffe, L. G.; Reynolds, J. L. and Mrs.; Reynolds, R. J., and Mrs.; Reynolds, Miss; Ringer, F. A. and Mrs.; Robertson, A. H.; Robinson, F.; Rose, J., and Mrs.; Slack, J. L.; Smiley, J. A. R., and Mrs.; Smith, A. R.; Smith, J. L. and Mrs.; Stones, Lionel; Sumner, John; Swinglehurst, J., and Mrs.; Swinn, C.; Thomas, Mrs.; Thomson, W.; Thorp, E. F. W.; Travis, H. A. and Mrs.; Travis, H. E.; Tyson, T.; Walton, J. Woodruff and Mrs.; West, H. T.; Westmacott, G. L.; Whitaker, R.; Wild, John, and Mrs.; Wilkinson, W. O. O.; Williams, Geo. A.; Woodruff, H. and Miss; Woodruff, T.; Woodruff, W.; Woolley, E. J. and Mrs.; Woolley, G. S. and Miss; Wyatt, Wm. and Mrs.

Marple—Taylor, H.

Newcastle-on-Tyne—Clague, T. M., and Mrs.

Northwich—Birtwisle, A.

Nottingham—Middleton, A. and Mrs.

Oldham—Bagshaw, H.; Crisdale, R. M., and Mrs.; Gartside, Chas., and Miss; Lees, J. and Mrs.; Shackleton, T.; Walters, Ed., and Mrs.

Oxford—Dolbear, John; Dolbear, P.; Druce, G. C.; Leach, F. H.

Paisley—Fraser, A.

Peebles—Lindsay, R., and Mrs.

Plymouth—Turney, J. D.

Sale—Gibson, H. and Mrs.; Smith, Allen.

Sheffield—Antcliffe, H., and Mrs.; Appleton, J. T.; Carr, Percy; Jackson, J. G.; Williams, H. G.

Sidcup—Jowett, Dr. H. A. D.

Southport—Cave, J. R.; Ratcliffe, Saml.; Righton, J. and Misses.

Stalybridge—Innes, D.; Simpson, A. and Mrs.

Stockport—Arnfield, J. C. and Mrs.; Barlow, A. H. and Mrs.; Crewe, P. H.; Forbes, R. T.; Orrell, W. P. and Mrs.; Roberts, H.; Roberts, W.

Stoke-on-Trent—Bentley, Thos.

Taunton—Howard, H.

Torquay—Quant, E. and Mrs.

Tunbridge Wells—Hobbs, A. E., and Mrs.; Wallis, T. E., and Mrs.

Ventnor—Dunning, Jas.

Warrington—Young, J. R. and Mrs.

Wigan—Phillips, J.

Worcester—Steward, J. A.

GENERAL MEETING,

Tuesday, July 23, 1907.

The Sessions of Conference were opened shortly after 9.30 a.m. on Tuesday in the Midland Hall, *Midland Hotel*, Manchester. There was a large attendance of members and friends, and the President, Mr. Thomas Tyrer, F.I.C., F.C.S., took the chair. The President was supported by the Lord Mayor of Manchester, the Mayor of Salford (Alderman Frankenburg), the President of the Pharmaceutical Society (Mr. J. Rymer Young), Messrs. J. C. Umney, G. Lunan, W. A. H. Naylor, E. S. Peck, E. White, F. Ransom, G. C. Druce, G. S. Woolley, T. H. W. Idris, M.P., Dr. Symes, and Dr. Walsh.

The PRESIDENT first called upon the Lord Mayor, Councillor Harrop.

The LORD MAYOR said it was a great pleasure to him that morning, on behalf of the citizens of Manchester, to welcome the British Pharmaceutical Conference among them. He was reminded that twenty years ago the Conference visited Manchester, and they would notice in fulfilling the programme arranged for their enjoyment the large growth of the city since then. During the last few years they had incorporated a number of outlying townships, and since they were there last they had opened that grand waterway from Manchester to the sea; their Ship Canal he was sure they would be interested in. He was speaking to a gentleman the other day from Dundee, and he remarked that the Manchester Ship Canal was one of the wonders of the world; and so it was. When he told them that in thirteen years Manchester, out of twenty-one ports of Great Britain stood the fifth largest port, they would pardon him if he took a little pride in mentioning that fact. He noticed the members of the Conference were going to visit some of the city galleries and buildings, and on behalf of the committees who carried on the work of those departments he gave them a hearty welcome. He could assure them that nothing would be wanting on their part to render all the possible assistance they could. With regard to the work of the Conference, he must confess he was entirely unaccustomed to it, but he was interested to find the Conference had 1,200 members and 120 foreign and colonial members, and that one of the objects was to maintain the uncom-

promising principle of purity in medicine. He was struck the other day in reading in a newspaper a speech by that distinguished surgeon Sir Frederick Treves, in which he said that medicine could be largely dispensed with, and he (Sir Frederick) himself preferred surgery and teaching hygiene. If that was true, then he (the Lord Mayor) thought those present would soon have to turn their attention to some other profession. In conclusion, he expressed the hope that their visit would prove a pleasant one and beneficial to the Conference, and that they would be able to discuss fully and profitably the great problems connected with their profession.

The MAYOR OF SALFORD said he heartily joined with the Lord Mayor of Manchester in giving the Conference a cordial welcome to Manchester and Salford. It was a double pleasure to him to be there to-day, because his good friend on his right (Mr. Tyrer) was their President. He had had the pleasure of knowing Mr. Tyrer for something like twenty-five years in connexion with the Society of Chemical Industry, of which Society Mr. Tyrer had been President. Personally he was looking forward with great pleasure to Wednesday, when he hoped to receive the Conference at a garden party. He must admit that at Salford they could not show them such wonderful things as Manchester could; but on the other hand, they would be able to show those present several beautiful parks. He hoped their deliberations would be a credit to the Conference and to the community at large.

The PRESIDENT said that they could not too highly appreciate the hospitality of the municipalities of the cities the Conference visited year by year. He had not found, however, that the Lord Mayor of London had received the Conference; that, he supposed, was a compliment and honour in store for them. It would be impossible, he thought, for the Lord Mayor of London himself to exceed the gracious and kindly hospitality of the Lord Mayor of Manchester the previous evening. He had never been more delighted with a reception. He felt sure all appreciated very highly the splendid reception given them by the Lord Mayor.

The LORD MAYOR OF MANCHESTER, in reply, said if those attending the reception were pleased, he himself was doubly so, because he thought the previous night that they could not have had a more agreeable evening.

Mr. G. S. WOOLLEY (President of the Local Executive) extended

a hearty welcome to the Conference on behalf of the local pharmacists. He assured them that no efforts on the part of the Local Committee would be wanting to render the visit of the Conference to Manchester an enjoyable and interesting one. He wished their good friend Mr. Atkins, of Salisbury, who was President of the Conference when it visited Manchester twenty years ago, could have been present. He was a gentleman who during his long life had rendered very great service to pharmacists. Since the Conference was at Manchester last there had been great changes in the *personnel* of it. There were one or two names which occurred to him, such as Scott-Brown and Benger, whose faces they missed that day. After touching on several other local changes, he remarked that they had had a very large and representative committee at work during the last few months, and all had worked loyally and very persistently. The work of direction had been carried out by the Secretary (Mr. Kirkby) and he would just like to say that Mr. Kirkby was a most hard-working and energetic Secretary, and had proved himself to be a master of organization. They were all greatly indebted to him, and whatever measure of success they might achieve, a very large proportion was due to the efforts of Mr. Kirkby. Their earnest desire was that the visit of the Conference would prove interesting and enjoyable, and they sincerely hoped those attending the meeting would go away with a very pleasant recollection of Manchester.

Letters of Apology for Absence.

Mr. E. Saville Peck read letters apologising for inability to attend the Conference from the following:—Dr. Attfield, Mr. S. R. Atkins, Mr. D. B. Dott, Mr. D. L. Howard, Mr. John Harrison, Mr. G. T. W. Newsholme, Mr. C. Thompson, Mr. F. C. Bird, Mr. P. MacEwan, Mr. W. Gowen Cross. Mr. Atkins in his letter said:—

"It is a matter of sincere regret to myself that I am unable to attend the meetings this year at Manchester. I am indebted to the Conference of 1887 for many interesting results. I saw Manchester under exceptionally favourable circumstances. The exhibition of art and industry was remarkable, and so was the crowd which gathered to the sight. The attendance at the Conference was a record one; the papers read and the discussions on them of much practical value. I shared

with my friend the late Mr. Schacht, of Clifton, the generous hospitality of my excellent friend Mr. G. S. Woolley, who, I am glad to know, still serves with marked ability the cause of pharmaceutical progress in Manchester."

PRESIDENTIAL ADDRESS.

By Thomas Tyrer, F.I.C., F.C.S.

The presidential addresses enshrined in the *Year Book* of the British Pharmaceutical Conference from 1870 to 1906 constitute a body of deliberate opinions on many matters of importance and interest to the pharmacist. Some have been of a historical character, others ethical, still more pharmaceutical, and a few educational. One cannot pretend to such an acquaintance from personal knowledge with pharmacy or pharmaceutical matters as would justify any authoritative utterance on any of these subjects, yet there are some points to which reference is appropriate. It has been strongly advocated that the Medical Council should secure the co-operation of pharmacists in the compilation of the Pharmacopœia. Directly, and yet indirectly, this was gained through the editorship of Professor Attfield, a former secretary and President of the Conference. The competency of practising and scientific pharmacists to aid the Medical Council has been emphasized by many, and the B.P.C. *Year Book* should be a useful reference work to that end. Happily, the co-operation of pharmacists has been sought and utilized by the Medical Council of Great Britain and Ireland in the form of an Advisory Committee nominated by the Pharmaceutical Societies of Great Britain and Ireland, comprising some of the most eminent and able members of the British Pharmaceutical Conference.

You probably are aware that in the United States the Pharmacopœia is not the work of a Medical Council, but the legalized result of the co-operation of a large number of qualified medical men, professors, pharmacists, and manufacturers. The United States *Dispensatory* or *Commentary*, edited by honorary members of the B.P.C., is admittedly a standard work of reference which few can afford to dispense with.

The passage of the National Food and Drugs Act last year

in the United States made its pharmacopœia (eighth revision) the standard for official substances, and forced a compliance with its requirements, and, in consequence, many communications were received by the Committee of Revision of the U.S. Pharmacopœia, requesting modifications in the official text. A list of additions and corrections was issued in May last. There are more than 200 pages paragraphed (see 19th edition of the U.S. Dispensatory) covering apparently 660 corrections and emendations, most of them, so far as one's perusal has gone, justifiable and reasonable.

The constitution and composition (*personnel*) of the U.S. Pharmacopœia Committee is a model worthy serious consideration by the British authorities. That is a committee thoroughly representative of all departments of practical pharmacy, galenical and non-galenical, including representative chemical manufacturers. It should be noted that the professional element is particularly strong and competent in the United States.

An excellent commentary on the value of an Advisory Committee is recorded in the latest journals, on "Juniper Oil," an example to be followed in cases of doubt. But, obviously, care must be taken in the selection of the committee in each case. It is incumbent on those responsible that the B.P.C. *Year Book* should be maintained as a work of reference for the medical man, pharmacist, and manufacturer. It may be asserted that, if the standard of its abstracts in chemistry, materia medica, botany and general pharmacy, to say nothing of what to one's mind is a greater necessity than ever—the *résumé* of scientific progress as the introduction, the bibliography, and notwithstanding recent useful collections, the notes and formulæ, is not sustained, then the main reason for the existence of the Conference and its *Year Book* ceases, and the one solid argument for attracting members disappears. The preface to the 1870 *Year Book* contains matter so appropriate to the conditions of to-day that it should be perused in the light of present experience and need. One assumes from the note then appended that it was the joint work of J. Cargill Brough and Joseph Ince. The following words may be quoted :—"It has been the earnest wish of the British Pharmaceutical Conference to link together, with some degree of systematic arrangement, various ideas—French, German, American and English—bearing on 'our common mistress, Pharmacy.'" If it is true that here, as in other countries, knowledge necessary to scientific pharmacy has

extended almost beyond the ability or power of any single mind to grasp, much less follow, then no more powerful argument is needed for maintaining the *Year Book* at all costs at a high level. Local enthusiasm, especially in great centres, always brings an accession of members; some of these secede in a short time.

A worthy cause has hitherto had a worthy and noble representation in the *Year Book*, which has called forth enthusiasm in no small degree, and enlisted the labours and energies of many able minds at a cost which is still as necessary as when the membership was larger and knowledge comparatively undiffused. Able, useful, and even notable as are abstracts relating to pharmacy and cognate subjects given in weekly trade journals, they are necessarily brief, selective, and diffused amid the bulk of other matter; exceedingly useful, because topical, but too frequently cast aside after hasty perusal, or—to put the point another way—not retained for reference as would be the same special matter in the *Year Book*. I advance a purely financial argument for securing the *Year Book* through membership. The fact is that it pays to have the necessary information collected in one volume for handy reference. The highest value attaches to bibliography as a necessary corollary to abstracts; therefore, in my opinion, that useful element of earlier *Year Books* should be resuscitated and developed. Let it be well understood that I am not finding fault with publication of collections of recipes, formulæ, prescriptions, and practical hints as a business speculation, but for matters eminently cognate to scientific pharmacy and its needs there is the collective medium of our now historic *Year Book*. This reference may be concluded by pointing out the utility of an introduction or reference to scientific work, which has hitherto been the work of the secretaries. When the volume of research in so many cognate branches of science is so great, it is necessary that an up-to-date summary should as far as possible be given. How suggestive are the latest records about serums, bacteriology, fermentation, colloidal states of matter, and even the latest theories in physical chemistry or chemical physics, which are not the same things. One is fully aware of the valuable *résumés* in all branches of science, theoretical and applied, which are presented at the annual meetings of many societies, and notably the annual report of scientific progress issued for the fourth year by the Chemical Society. Yet one pleads that for the pharmacist the *Year Book* on

the lines of those published in the 70's is the most suitable organ for such a *résumé* of work and cognate science. Therefore it is that hesitating members and reluctant recruits are doing harm to their own interests and exhibiting small recognition of the excellent and often self-denying labours of your officers.

If it be in any sense true that the differentiation between the trained pharmacist by examination and the admitted chemist and druggist by a minor Examination, apparent in earlier times, is still a fact, then the function of the B.P.C. and its *Year Book* is not diminished but exalted, and the responsibility of removing or reducing an epitome of knowledge and a mine of experience correspondingly increased. In this instance your presiding officer has not had the advantage of serving an apprenticeship on the executive before assuming the presidency; therefore his views must not be in any way confounded with theirs or of his predecessors. What really is the trivial subscription for a practical up-to-date reference book? So much for the *Year Book*.

May one suggest, as Umney did, "that although the annual Conference gives opportunities for knowing, cultivating, and enjoying the friendship of one's *confrères*, the primary object of the B.P.C. is the dissemination of knowledge and interchange of experiences and opinions, which should ever be the end and aim, therefore continuous."

Research or investigation is impossible without knowledge—at any rate, its scope is narrowed and progress impeded. As many recent remedies and therapeutic agents are synthetic and experimental, it is absolutely necessary to be guided by research. An intelligent perusal of modern patents is, to say the least, made difficult in the absence of adequate knowledge. Predecessors in the office of President have often referred to the value of research, and deplored the fact that other nations have outstripped us in this essential condition of progress. May not the question again fairly be asked, What is research? Professor Meldola, in his recent address to the Chemical Society, discusses the matter fully and fearlessly. He is of opinion that the submergence of the research-talent is going on to a disastrous degree in this country. He differentiates strongly and clearly between the mere "tester" and the man who can conduct a research scientifically and work out problems. Umney in his addresses in 1889 and 1890 indicated "that the only way to meet the future of pharmacy as a 'trade' was not only individu-

ally and collectively to maintain, but also to advance by research and every possible means, all matters bearing on scientific pharmacy." In 1889 he indicated that historic drug houses, acting as manufacturers, had neglected research. Each establishment should have its chemists engaged in the examination of new remedies, etc., which "must tend to keep us out of the hands of foreigners." Is this less true to-day ?

Professor Meldola names among the institutions doing good work and turning out good men the research laboratory of the Pharmaceutical Society, to the work from which reference is made later on. Other places are named from which research work has issued, some not primarily founded for that purpose, among them semi-private institutions such as the Lawes' Agricultural Station at Rothampsted, the Wellcome Research Laboratories, directed by Dr. F. B. Power, and from which notable contributions to our knowledge of materia medica and pharmaceutical chemistry have been made. The physiological laboratories associated with the same enterprise contribute in their way research work as valuable to medicine and pharmacy as that of the Lister Institute or of the Schools of Tropical Medicine in London and Liverpool. From all these, researches in pharmacology of profound interest and ultimate benefit to pharmacy do and must issue. Neither was named the Imperial Institute, which is, perhaps, a more useful establishment as a research laboratory than as originally contemplated, but from which very valuable work, useful in pharmacognosy, is frequently reported. Nor the Institute of Commercial Research in the Tropics, founded in 1906, and connected with the Liverpool University. The contents index of its beautifully illustrated quarterly journals evidences excellent work rather of the order of "investigation." This institution is of a type which should be liberally supported, as tending most directly in the interests of technology, as perusal abundantly testifies, and because it is supported by typical men who know what they want and would not support anything which did not pretty directly supply those wants. On its Council one finds the names of John J. Evans, W. H. Lever, E. K. Muspratt, representing our ring of industries, in addition to shipowners, trading associations, and directly linked to the Chamber of Commerce in the person of its hon. secretary. A noteworthy feature is the professional board, on which botany is represented by Professor R. J. Harvey Gibson, F.L.S. ; zoology by Professor Herdman, F.R.S., of the Linnean ; physiological chemistry by

Professor Moore; tropical hygiene and sanitation by Professor Ronald Ross, F.R.S.; engineering by Professor Watkinson, M.I.C.E.; while its director is Viscount Mountmorres, a Fellow of the Royal, Linnean, and Geographical Societies. Doubtless Professor Meldola hesitated to indicate many places in the kingdom where research is admittedly carried on, but in view of his general criticism one has ventured to name others having some topical interest. There are several others which the Press may trouble to indicate in commenting on the deficiencies of this discourse. The Guinness Research Laboratory, for instance, directed by Dr. Horace Brown, F.R.S., whose work on *Fermentation, Starches, and the Respiration of Plants* is classic, and whose opinion and work is quoted later.

If it be true that the retail pharmacist is less a practising pharmacist than he once was, then it has become emphatically needful that the manufacturing pharmacist should himself be scientifically trained and equipped, and possess the spirit of research, or employ those who have it. Not every one who knows the "pass" quantity of chemistry, physics (*en passant*, there is too little of physics in the pharmaceutical curriculum), botany, or materia medica can become, or is a competent "researcher." Knowledge of the principles of the sciences cognate to his investigation is essential. The gift of "imagination" in the Tyndalian sense is an enormous advantage. Happy he who possesses this gift already, but it can be cultivated and encouraged by the use of the faculties of observation and deduction, stimulated by studying current scientific literature, and in this particular the B.P.C. can, and should, collate and index knowledge of attained facts.

What is research, then? It certainly is not guessing, although there are instances of so-called "luck" in that art. It is not a "shuffling" (to employ a metaphor) of mental impressions, or even scientific data, with some skill and expecting to turn up "trumps."

A few definitions of research given by some of the eminent wise and learned of the day in reply to one's inquiries may interest you. One whose name is intimately associated with our knowledge of a family of new gaseous elements described by Professor Chandler, of New York, as the "laziest" lot of elements ever heard of—argon, neon, krypton, xenon, and even helium—quotes Webster: "A diligent and protracted seeking after the facts and theories of the science which deals with the elements of

matter, the proportions in which they combine, the means of their separation, and the laws which govern and affect those agencies." Sir William Ramsay has done his part in living up to this definition. Yet in a recent communication to the Society of Chemical Industry upon "The Advantages of Investigating the Unlikely," he suggested that science and industry should attend to "trifles." Sir William wisely supposed that it was possible in real life to judge what are trifles and what are not. But in science it is not so easy. He elaborated the idea of "imagination" in a striking way. "We are a sporting race. There are two ways of working. You can either do what is already done—you can earn your daily bread, get in your money, save it, and do a day's work in a day, and so be content; or you can speculate. These two courses have their analogies in chemistry. You can either follow the regular routine and prepare organic compounds, each new one of which is so like the last that its properties and behaviour can be predicted. Occasionally an interesting compound turns up, interesting because it differs from what might have been expected. Though there are some giants —for example, Professor Emil Fischer, of Berlin—the average man is content to do little bits of work of this nature, and is quite happy. On the other hand, it is possible to give a hostage to fortune, as it were—to try something that is not very probable. Some people like to do ordinary routine work. Some, on the contrary, like to tempt Providence. I am one of those who prefer the latter course, and I venture to think that Providence has recompensed me to some extent." Now, this may be termed "guessing"; but, if so, it is "scientific." You remember the now historic "guess" that the unabsorbed "bubble" in the Cavendish investigation might be an unknown constituent of the atmosphere. The results of research or investigation in the hands and brains of a Rayleigh and Ramsay are incalculable. Take an instance of a different type. Professor Ramsay's work is, of course, historic, and that on argon, helium, and allied gases, which attracted so much attention a few years ago, has been extended, more particularly with reference to the behaviour of these gases at low temperatures and under diminished pressures from the spectrographic standpoint. Sir William, in connexion with Soddy, has developed the radium question, and by the discovery that helium can arise from radium opened up the possibility of transmutation, which is now more seriously considered than at any date since mediæval times, the latest

contribution being so recently as June 20, when the life or duration of an emanation was discussed.

Dr. T. E. Thorpe, not unknown to pharmacists, writes:—"The distinction drawn between investigation and research is rather subtle. If I should be asked to name a man who combines in the highest degree the attributes of the successful technologist with the purely scientific instincts, the name that immediately occurs to one is Lord Kelvin, a man of very complex personality, with remarkable mental characteristics, which deliberately thought over and analysed, furnish a definition of the ideal technologist. But, then, Kelvin is a man in a million, and I suppose the ideal technologist is equally rare."

Lord Kelvin has been so good as to send me these few words signed by himself in his clear, bold hand. "Research may be defined as endeavour to extend our knowledge of the properties of matter." Lord Kelvin lately claimed to be a "chemist," for he burnt his fingers with phosphorus when eighty-two, while Lord Rayleigh claimed kinship since he burned his with the same substance at twelve years of age.

Dr. Ludwig Mond, F.R.S., whose technical successes and benefactions to science at the Royal Institution, the Davy Faraday Research Laboratory, and, not the least, the Schorlemmer and Schunck Laboratory of your Victoria University, and who may without doubt be regarded as a scientific technologist, made a speech on the opening of that laboratory. It is reported in full in the *Journal of the Society of Chemical Industry* for 1895. He observed in an eloquent passage: "A new principle once acquired will soon be found applicable to the requirements of our daily life. Any advance in pure science is very soon followed by advances in our industries. To cite an example, we owe far more to Faraday's scientific work in electricity than to all the numberless inventors who have followed up his discoveries and put them to practical use." To my mind, one of the most interesting, even fascinating, tales of the results of observation and scientific deduction is his account in the same journal and year of the history of the Mond Nickel process, given in New York. Briefly, it amounted to this, that the vapour of ammonium chloride not only acts on oxides and salts, but also violently attacks the large majority of metals. Valves were required which had to be very tight to prevent a large loss of ammonia. It was found that nickel was suitable. In the laboratory nickel valves worked perfectly; on the manufactur-

ing scale, badly. They became encrusted with a black substance which proved to be carbon. This seemed mysterious, but in the laboratory the ammonia was swept out of the apparatus before admitting hot air, while on the large scale gases from a lime kiln, containing a few per cent. of carbon monoxide gained access. This led to an investigation of the action of CO on nickel. A great deal of CO was decomposed by a small quantity of nickel. In experiments where CO was used the escaping CO was lit in order to keep this poisonous gas out of the atmosphere. At a point in cooling, the flame became luminous and a spot like unto arsenic was deposited on porcelain. Observation led to experiment, and every indication being followed, the marvellous substance nickel carbonyl became the factor in a unique and, after many vicissitudes, a flourishing industry. The brilliant technical achievements of Dr. Mond and his coadjutors are due to the relentless following up of clues or indications, themselves the result of observation.

This spirit has no more forcible illustration than in the ultimate successes in the Solvay process for alkali production on the Continent and in Lancashire and Cheshire. The original and now familiar Hemming and Dyer patent, embodying the master idea or reaction was a dead letter until the physical problems were solved, and these largely by the aid of the engineer—the chemical engineer. These problems involved mighty considerations of the conservation of heat energy, the fundamental principles of which were laid by Joule in the old Owens College, in this very city. How Dr. Mond has solved those problems may be recorded possibly in the Patent Office, but the testimony stands in gas processes which have cheapened the production of ammonia soda, as well as Leblanc.

By the utilization of the sombre pit mound wastes of the Midlands there has been placed a gaseous fuel at the disposal of the electrical engineer which, notwithstanding the large percentage of inert gases, results in power as cheap as at Niagara, which does to-day in these Midlands give power for the electrical production of phosphorus by Albright and Wilson as cheaply as at Niagara. These two great technical advances emphasize the value of scientific observation. In the one case, cheap, smokeless, or gaeous fuel was needed, the usual process of production involving waste of that proportion of nitrogen which was evolved as ammonia; which, again, is a necessity of the ammonia-soda process. Ammonium salts are volatile in an

extraordinary degree, therefore the problem was to waste no nitrogen capable of forming ammonia and to waste no ammonia. The crux of the ammonia-soda process lay in the solution of these two problems, and they have been solved by observation and deduction. It is worthy of note that "Mond" gas, containing so much inert gas, should when employed as a motive force present peculiar problems. No finer illustration of scientific means to this end can be afforded than the paper of Mr. R. Threlfall, F.R.S., recently printed in the *Journal of the Society of Chemical Industry*, June, 1907. Himself a man of great scientific and mathematical ability and experience, he finds his latest interest and gratification in surmounting the difficulties presented by the employment of "Mond" gas—an "old friend with a new face."

Justice to the older Leblanc process should be done. Ruin stared it in the face. Weldon long ago showed that its salvation was its economical production of chlorine from surplus hydrochloric acid, yet he was, with strange irony, an adventurer in fields of technical research for the production of chlorine, which would have assisted in the downfall of the Leblanc process. Precisely the same use of scientific principles and knowledge have saved the situation and prolonged its existence, despite notorious yet possibly unavoidable over-capitalization. The recent notable and useful address at Birmingham of the retiring President of the Society of Chemical Industry should be carefully perused in this connexion. The United Alkali Company's central laboratory at Widnes may vie with any in equipment and staff.

To pharmacists it will be gratifying to feel that among the many scientific workers attached to that colossal concern, not the least conspicuous is one bearing the honoured name of Conroy. The son, Dr. James Conroy, bears proudly his father's name and ability.

Another great scientific technologist, the late Sir W. Perkin, F.R.S., the jubilee of whose greatest invention was recently celebrated all over the civilized world, and whose death the whole of the scientific and technical world deplores, ascribed his successes to the possession of this power of observation. His life-work has been so very recently and fully described by himself in England and America that it must all be fresh in your minds. Yet it was in the search for synthetic or artificial quinine, then an "awful" price, and with the natural alkaloid of which

the name of our members the Howards is indissolubly linked. Observing (note the part "observation" played) a colouration, Perkin followed up the indication, and ultimately "mauve" resulted, and in its train much which redounded to the credit and prestige of Britain.

Sir W. H. Perkin himself modestly observed that he saw "no essential difference between research and investigation." Neither is there.

In a speech during the Jubilee celebrations, Perkin said, referring to the older industries and the absence of old-fashioned prejudices to interfere with the new dye industry, "The origin and foundation was the outcome of scientific research. Its development has been due to research, hence its unique character and marvellous growth—the fruit of the union of science and industry. It was said that by my example I had done harm to science, and diverted the minds of young men from pure to applied science. This soon righted itself, and this union of science and industry has had most beneficial results, because they have been handmaids to one another in a most remarkable way, chemical science having made a progress it never could have made without the aid of this industry. The greatest chemists in the world have been occupied with the problems related to this industry, many of which are of the deepest and most abstruse nature, and now we also see in the colour works armies of highly-trained men as well as eminent chemists incessantly at work, many occupied with research, whilst others are engaged in superintending and improving chemical operations in different departments. The production is low in cost and of so high a state of purity that the old dye stuffs cannot compete and, in fact, many have gone out of use. By the study of the coal tar colours a wonderful insight has also been obtained in reference to the colouring matters found in Nature, in roots, dye-woods, petals of flowers, etc., showing the remarkable fact that nearly all, if not all, are related to the coal tar products, and not only so, but it has enabled chemists to produce some of them on the large scale artificially. Among these is 'Alizarine,' the colouring principle found in madder. Another is indigo, and in 1879 Bayer established the structural formula, then elaborated a process of manufacture, too dear at that time, but twenty-seven years later the chemical product rivals the natural, which is month by month being driven out of cultivation." Another remarkable instance of the fruits of preserving scientific research

made both for its own sake and also in connexion with industry. "We must not forget that the origin of them all is research made for the sake of getting a deeper knowledge of the laws and secrets of Nature." Sir William was the first to apply Faraday's wonderful observations on the magnetic rotation of light to the discrimination of the chemical constitution of organic compounds. This work, which started in 1888, Perkin persevered with vigorously ever since, and with ever-increasing importance.

Professor W. H. Perkin, Jun., F.R.S., of the Schorlemmer and Schunck Laboratory here, writes :—"Chemical research may be likened to a traveller exploring an unknown country in a spirit of adventure. If he is a good observer he may discover gold and precious stones, but in any case he is sure to obtain results of value to mankind." This opinion is singularly corroborative of his father's and Sir Wm. Ramsay's ideas. And this chemist may be said to represent the nearest approach we have in this country to those distinguished German professors who have built up a "school." His most conspicuous of recent achievements is the synthesis of the two naturally occurring terpenes *d*-limonene and dipentene. This is a very remarkable piece of work, and the author has made also valuable inquiries into the natural products brasilin and hæmatoxylin. Not all know that Dr. Schunck bequeathed his unique laboratory and equipment for re-erection and association with the Schorlemmer laboratory.

Professor Henderson, of the "Andersonian," Glasgow, successor to Dittmar, and an examiner at the Institute of Chemistry, is clear that "Research is work in any branch of the science (inorganic, organic, or physical, analytical and technological) which results in the discovery of new facts, or in the formulation of laws based on discovered facts." Thus no field of experimental work is held to be barren. Professor Henderson's recent work, "The action of chromyl chloride on various unsaturated hydrocarbons (including pinene)," is a notable piece of research.

Professor Stanley Kipping, F.R.S., of Nottingham, defines "Research" as a "systematic investigation with the object of discovering chemical facts. But," he delightfully continues, "the chemist's greatest source of pleasure and the least profitable of all occupations from a pecuniary point of view, unless it is of the commercial variety."

The question of racemization has been studied by him from the point of view of racemic liquids, wherever they exist. Much work has been done with hydrindamine, and the configuration

of quinquevalent nitrogen has been studied. His latest work shows that optical activity may arise from an asymmetric silicon atom.

Professors of the School of Pharmacy, the "Square," have adumbrated definitions. Dr. Attfield, a worthy instructor (the cause of whose absence to-day we all deplore), says :—"Research is the bringing of truth from the region of the unknown into the region of the known." That is wisely uttered, and are not his text books his "monument"?

Professor Dunstan, F.R.S., regards the question as a large one and not quite easy to answer, but he well does, in a paper he read at the York meeting of the British Association in 1906 on "Some Imperial Aspects of Applied Chemistry," which will amply repay perusal. It is "observation and deduction with experiment on scientific lines." His earlier work on the nitrites and the alkaloids (contributed to by familiar men—Dymond, Woolley, Lloyd, D. Williams, Ince, Tutton, Umney, Passmore, and Hills), particularly those of the aconite group, has been continued, and more recently cases of cyanogenesis in plants have been studied, *Phaseolus lunatus* and the root of bitter cassava having been shown to contain a glucoside which, under enzymic influence, liberates prussic acid.

Professor Norman Collie, F.R.S., now Professor of Organic Chemistry in University College, is no mean exponent of true research, as not only his recent work but his research at the "Square" on the production of pyridine derivatives, ethylic β-amido-crotonate, with Frye on the action of bromine and benzoine, and Garsed on cocaine.

His successor, Professor Wynne, F.R.S., now at Sheffield, refers one to the Oxford dictionary, and remarks that the definition given "covers the meaning associated with the word in all humanistic and scientific studies, and therefore in chemistry 'research' is an investigation into things directed to the discovery of some fact by careful consideration or study of a subject; whilst usually concerned with the discovery of new facts, the word also covers the correlations of facts already known."

The genial Dean of the "School," Professor A. W. Crossley, F.R.S., whom we congratulate on his recent honour, takes the orthodox view, and has been concerned chiefly in the study of the important class of hydro-aromatic compounds which derive their interest from the relation they bear to the hydrocarbons of the terpene series. His papers, in collaboration with Miss

Renouf, notably on dihydro-laurolene and dihydro-isolaurolene, true hydrocarbons derivable from certain camphor derivatives, is notable in connexion with present technical research.

Professor W. A. Tilden, F.R.S., whose early association with the "Square" and with Professor Redwood will be remembered, has been making an extended study of the atomic heat of elements and an investigation of gases occluded in minerals, also many papers on organic subjects, chiefly connected with pinene. His name will always be associated with an "accidental" production of caoutchouc during his researches on the "terpenes," but which never repeated itself nor has been repeated so far as one knows.

Professor Greenish's contributions to scientific pharmacy indicate the character of the work carried on in the pharmaceutical laboratory, and are complete illustrations of the conditions insisted on for successful research.

Professor Green's retirement from the chair of botany leaves that science the poorer.

The work done in the Research laboratory at the "Square" is creditable alike to professors and students.

The Hanbury medal, on the committee for the awarding of which your President for the time being has an honourable place, was lately awarded to a past student of the "Square" school, Mr. David Hooper, of Calcutta.

May we not pleasurably note the recognition of our foundational science, botany, by the bestowal of the Order of Merit upon that veteran, Sir J. D. Hooker?

The distinguished President of the Institute of Chemistry, bearing the honoured name of Frankland, says:—"Diligent inquiry or examination in seeking facts or principles; laborious or continued search after truth, are definitions of 'Research' which I find in my dictionary. I do not think they can be much improved upon."

Professor Frankland gives an example: "The analysis of a particular specimen of anything, the general composition of which was already known, I should not regard as research, although the analysis of a number of specimens with a view to determining the general relationship between composition and properties, origin, etc., would be of the nature of research." Dr. Frankland's recent work on the relation of rotation and molecular volume throws great light on the molecular constitution of certain organic bodies, notably tatramide and derivatives.

Sir Wm. Crookes, F.R.S., the eminent scientist who assisted investigations in high vacua, by the introduction of his "tube," has difficulty in finding a satisfactory definition of "Research." He believes that the qualities for a successful researcher are inborn, and observes, that on reading General Baden-Powell's book on scouting, he made an analogy with the successful scout in exploration and a successful researcher in science. "What directs particular attention to a line of research is a mystery. He says a particular subject takes hold of one, and he instantly feels he has found his occupation." Sir William delightfully remarks:—"What made me first take up the subject of the rare earths I cannot tell. I was working at them in 1849, and I have been pretty faithful to my first love ever since, except for a few flirtations with high vacua."

It is not inappropriate here to say that if there is one field of research more than another where investigation in the true spirit of research is necessary, it is in that of the rare earths on a large scale. His work on radiology has been continued with the aid of the new knowledge of radium itself, and his interest in the question of the fixation of nitrogen from the atmosphere is well known, and is a marvellous piece of scientific adventure.

The physical conditions under which chemical change takes place, and the demand for research in order to reproduce, apply and ultimately employ them, are well exemplified in the utilization of atmospheric nitrogen, for fertilizing materials, in anticipation of the shortage of Chilian saltpetre (nitrate of soda). Sir Wm. Crookes has in season and out of season declared that one day there must be a shortage of wheat, owing to exhaustion of soils and of space, and not less the exhaustion of the world's supply of fixed nitrogen. Every fireplace and furnace is contributing to this exhaustion, and one contemplates with satisfaction how, needing salts of ammonia, Mond and his co-workers utilized the fixed nitrogen in the fuels and obtained both the chemical equivalents of salts and heat units. Quoting Crookes: "Every square yard of our earth's surface has about seven tons of nitrogen pressing down on it. Free, this gaseous nitrogen is apparently worthless; combined as nitrate of soda it would be worth about £2,000." Speaking prophetically, as in the spirit of those who should not prophesy unless they know, he performed his experiment in 1892 at one of the *soirées* of the Royal Society, "The Flame of Burning Nitrogen." "The terrible possibility of flaming nitrogen spreading through the air and deluging

the world in a sea of acid is referred to only to allay all fear by the simple statement of scientific fact that the igniting point of nitrogen is higher than the temperature of its flame." After discussing the probabilities of the exhaustion of available energy from fuel, Sir William remarks "that the future can take care of itself in view of the fact that Niagara alone is capable of supplying the required electrical energy without much diminution to its mighty flow. So probably at a not distant future the source of energy may be at the Victoria Falls in Central Africa, and soon the ebb and flow of tides in our large rivers." Certainly if Mond's estimates and hopes are within reason, a source large enough for exploitation lies in the waste shales of our own country. This has only been accomplished by patient research, and the problems of the future can only be solved in the same way. This important and fascinating subject has received able scientific exposition from Mr. F. Howles, M.Sc., in a paper read last March before the Manchester section of the Society of Chemical Industry, in which adequate consideration is given to the Mond gas process and the securing of ammonium sulphate. Reference is made to the present waste of the enormous volumes of blast furnace gases—another subject for all-round research. Other papers by Guye, Frankland, and Whitehouse before the same Society in London and this by Howles should be studied in this connexion.

It may be interesting to learn that in a short time "cyanamide" will be on this market in quantity from Sweden, at a price rivalling the nitrate of soda equivalent of nitrogen.

Professor Armstrong has always maintained, in season and out of season, the absolute necessity of research as "the" element of scientific and technical progress. Years ago he asserted to incredulous readers and hearers that all research ultimately leads to industrial results or ends in technology. He has, in taking Professor Meldola's address as his text, just been writing in the *Times* (see supplements May 8 and 18) on "British Neglect of Chemical Research." Dr. Armstrong quotes Professor Meldola so largely that I refer you to the original, but he calls attention to the question whether the "British output of research is really representative of the nation, and such as might be expected in view of the potential talent known to exist. Professor Meldola has not only felt the pulse of the patient, but successfully diagnosed the disease 'intellectual starvation,' arising from the impractical system of training, itself the outcome of failure to understand the conditions of progress as well as of

lack of imagination and of worthy ideals." The enthusiastic professor goes on to arraign the systems of the older universities, but his indictment of them leads to a fine passage in which is an attempt to define research. Indeed, it was chiefly to answer one's question to him, "What is research?" that determined the recent letters to the *Times*. "Original research may be said to be the considered art of inquiry, organized inquiry, into the unknown. Modern progress is the outcome of such inquiry." He calls our present system one of fact—fact-worship—and dogmatism, which involves the strangulation of capacity. "Research work is the one means known to us of keeping teachers alive and training students to think for themselves, the one and only means of establishing a forward outlook." There is very grave truth in the criticism that our universities make research work the subject of post-graduate study instead of regarding it as the necessary preliminary to the degree as the Germans do; consequently, very few engage in it, and these, as a rule, come to the work with minds cramped by academic studies, and more or less encrusted with prejudice.

Dr. Edward Divers, F.R.S., Emeritus Professor of Chemistry in the University of Tokio, who has after twenty-six arduous years in that progressive land returned only to engage in every good scientific or educational work, defines research as the *re*-search after truth in the partially known or the unknown. His communication is like much of his work, a criticism and a philological monograph or essay. "The ancients were true and real searchers—notwithstanding their approximations or guesses. We moderns are in many cases only re-searching, and often in less truly inquiring spirit." Professor Divers has special claims to the admiration of pharmacists, in that in 1871 he defined the composition of the ammonium carbonates— the work which obtained for him in 1871 his F.R.S.

Professor Pope, F.R.S., to whom with his colleague, Professor Hubner, we shall be indebted for a useful demonstration at the Municipal School of Technology, affiliated with the Victoria University—observes that "it is customary to make a sharp distinction between research of an avowedly technical character and of a purely scientific nature. This seems to involve a gratuitous assumption concerning what one does not know, and which one hopes to find out; that one can tell beforehand whether it will or will not have technical applications. Further, that frequently a piece of technical investigation has

no technical results, but has important scientific ones; and also that a piece of scientific research which looks beforehand as if it could have no technical applications often revolutionizes whole industries. As examples, those in the coal tar colour industry, the saccharin manufacture, the incandescent mantle, the electric furnace industries, liquid air, and many other instances." Professor Pope's acute scientific perception supplied the missing link in Van 't Hoff's splendid generalization, and established his position in Britain's scientific roll of honour. Van 't Hoff showed that to account for the behaviour of carbon compounds one must assume that the molecule of such substances is extended in space, not simply in a plane, as would appear from Kekulé's formula. Van 't Hoff neglected, however, to develop the experimental methods for proving his case. These experimental methods Pope produced, and showed further that, to account for the behaviour of all compounds one must assume that the molecule is extended in space. It thus became clear that stereochemistry is of universal application, and is not applicable solely, as Van 't Hoff showed, to carbon compounds. Then, by pushing this stereochemical work further, largely upon the basis of crystallographic investigation, Pope, in collaboration with Barlow, showed that the question of valency finds a very simple and rational explanation; that the valency of an atom is, in fact, directly proportional to the space which it occupies in the molecule. Reference is made particularly to these researches, because they show that the managers of the Technical School here have wisely appointed a man of the highest scientific attainments, with sane views on the bearing of science in technology.

This symposium of definitions may fitly be supplemented by the opinions of two men not unknown in Manchester. Dr. J. Lewkowitsch, whose work on *Oils, Fat, and Waxes* (and their relative—Soap) is a classic, believes that every man, be he shoemaker, manufacturer, or teacher of science, should practise research. The first requisite, he thinks, should be the "yearning for truth." But there must be the proper preparation for research. The manufacturer probably would confine his research to an investigation into the phenomenon underlying his processes, so as to discover better or cheaper methods. Perchance this might lead on to his becoming an investigator in the best sense of the term; thus he would scarcely differ from those who are expected to be the researchers *par excellence*—viz.,

the professors of the schools where the raw material is trained to blossom duly into the "research" chemist. The Doctor sententiously observes: "These teachers should first show that they can carry out an investigation or a research."

Dr. Markel, who will be our guide, philosopher, and friend on the "extra" day, says the inquiry is a "big one." Truly it is, hence my labouring of the point; but he says: "Research in the most general sense is an inquiry, investigation, or experiment pursued with the object of adding in one of the branches of science to the sum of things known. The essential of research is that it should produce a totally new result. The term may properly be applied to inquiries or experiments having for their object the recovery of knowledge lost to mankind; it may also be applied to work undertaken in order to more completely establish results already obtained, but in the interests of precision and that dignity which ought to attach to the word 'research,' I would deprecate its indiscriminate use for work of a low order."

The MacArthur-Forrest cyanide processes are cases in point; also the marked improvements in the treatment of oil shales in Scotland by Beilby and Young, and in cyanides by the former, support the value of the contention as to the necessity of research in technology.

In connexion with processes for the desulphurization, removal, and utilization of cyanogen and other contaminations from gas, the exploitation and improvement of saccharin (now manufactured in England)—all the result of close research—the name of one of the chairmen of the London Section of the Society of Chemical Industry, Mr. A. Gordon Salamon, should be associated.

Another chairman, Mr. W. F. Reid, an accomplished linguist and technologist, and a "Hofmannite," criticizes the word "research" as being an appropriate term when learned men sought their knowledge in the works of the ancients. Higher education was the seeking out of that knowledge in which Oxford and Cambridge are for the most part still engaged. Mr. Reid justifies scientific incredulity as to textbooks, many statements in which are only relatively true. Therefore the student should gauge and test the statements so far as they relate to the work in hand. He observes this "scepticism" has made a Curie and a Ramsay. He condemns examinational knowledge, and has found that for positions of responsibility observers and thinkers have done best, and remarks that, after all, science is a homogeneous web, not a patchwork quilt. Reid is an acute observer, and

among his many results was his discovery of the gelatinization of nitro-cellulose by which the explosive force and velocity of ignition were regulated to a nicety. Reid was, in fact, the discoverer of smokeless powder, which the British Government declined, while that of France adopted it. "Perseverance is an essential element of success, and if the researcher realizes that nine-tenths of his experiments will probably be failures, and he goes on, he bids fair to win."

Mr. R. J. Friswell, the present chairman, a man of very wide technical experience, defines research as experimental inquiry into the relations of natural phenomena to each other. He remarks that research has two great divisions in practice:—"1. Pure research, where the facts or laws ascertained are sole objects of the work. 2. Applied research, where the object is to ascertain particularly facts or laws having a bearing of a commercial value on some industry. The second is more restricted than the first, as from the nature of the case it is confined to certain definite lines, and no deviation or divagation is permissible." Mr. Friswell observes:—"That there appears to be a prejudice abroad that one of these lines of work is of much greater dignity than the other; this is a relic of an age when there existed no class bound to work or starve. It then had its use."

There is an excellent reason in the fact that you have a paper in the proceedings on "Plant Diseases" for noticing the marvellous research work of Dr. Horace Brown, F.R.S., whose work on the scientific aspects of the brewing industry, and cognate thereto, rival those of an old and lamented friend, O'Sullivan, director of the research laboratory at Messrs. Bass's at Burton. The starting point of all these researches—in the brewery and in the Guinness Research Laboratory—originated in an attempt to explain a simple technical point in brewing. The particular research will be found in the Chemical Society's Journal for May, 1893. The addition in some localities of a small quantity of dry hops to the finished beer had produced a strongly marked effect, which had been noted for generations but never explained. Drs. Brown and Morris investigated these phenomena with resulting mass of research work of the most minute character, but by no means distantly allied to the botanical, chemical and physiological aspects of practical pharmacognosy. One notes with pleasure that associated with the talented scientist was Mr. F. Escombe, F.L.S., a well-known botanist. The transactions of the Guinness Laboratory are most illuminating and valuable.

Dr. Brown's well-known work on starch transformation is being continued, and an acceptable theory put forward to explain the occurrence of maltose and the malto-dextrin among the products of starch degradation. More recently the author has carried out important experiments on the diffusion of gases, with special reference to the mechanism of plant respiration; these have involved the elaboration of a new method of determining the rate of assimilation of carbon dioxide by leaves, and the ultimate outcome of the work, which is being continued, will be most important, probably, to the scientific pharmacist.

Parenthetically, one thinks one sees in the association of eminent pharmacists, each of whom has contributed quite notable works to scientific pharmacy, with the Pharmacopœia Committee of the Council, the natural corollary to the reduction of the time given to materia medica in the medical curriculum, and eventually, if wisdom prevails, of that desirable differentiation of prescribing and dispensing, which is the "law" in Germany at least.

Sir H. E. Roscoe, whose name and labours are so honourably associated with your University, in a reference in his delightful "experiences" to the "Dalton" Scholarship and the men who gained it, observes "that the stimulus to original work must be given by the teacher, and it is he only whose head, hand, and heart are thus occupied who can induce others to follow the same difficult, though delightful, path. The spirit of research must be felt in the atmosphere of the laboratory, and in this respect there ought to be no difference between pure science and its applications. To prosecute one or other the methods of research must be learned and followed." This influence of the teacher reminds one that, like Hofmann, Roscoe's influence with students was very great and intimate, and the men who lent lustre to their *alma mater*, Owens, are to-day loudest in their appreciation of this essential requisite of their true teacher. Ask in Lancashire, Yorkshire, and the world over. The same characterizes the influence of Ramsay. It is fitting here that we should congratulate the Victoria University and Manchester upon the accession of Professor Rutherford, of radium emanation fame, to the chair vacated by Emeritus Professor Schuster, another exponent of true research.

As one recalls recent triumphs of scientific technology—the direct results of research—one is almost alarmed. The alarm arises from the sense of one's impotence in face of the vast field for fertile research—accomplished and to be accomplished.

Take alone the fuel question, to the philosophy of which Armstrong and Dixon, here, contributed so much. The memorable discovery by the latter of the incombustibility of carbon monoxide in the absence of water in 1884 opened a new era. Then came H. B. Baker's startling observation on the influence of moisture on the occurrence of chemical change, demonstrated in 1903 by the incombustibility of hydrogen even when wet, in the absence of impurity calculated to render water an electrolytic conductor. Dixon's contributions to physical chemistry take high rank among the best work of our time. Ah, but it is all observation, deduction, and experimental proof "research."

It may seem a far cry from the fixation of nitrogen to the manufacture of soap, which, as Lewkowitsch observes, has only been too long looked upon as a mere art, to the rank of a scientifically founded industry, the operations of which are governed by the laws of mass action, the phase rule, and the modern chemistry of colloids. Now, ask ourselves how many technologists and pharmacists—at any rate, manufacturing pharmacists are technologists—have studied these factors in "scale" operations? Is not our frequent trouble that things "go" in the laboratory and do not "go" in the factory? Mass action is intelligible as a factor without much intellectual exertion, but the "phase" rule, what is it? Some textbook definitions make it a little mysterious. Professor Pope puts it thus:—"The phase rule is merely a convenient method of stating the results of observation. Apart from the ease with which it enables us to classify experimental results on the equilibrium between solutions and solids, it is useless. That is to say, one cannot derive any new information from the consideration of the phase rule alone. It has been applied with results of technological importance only to the question of the separation of the numerous salts which occur in the Stassfurt salt deposits; this application was made by Van 't Hoff, and has greatly facilitated the separation of pure products from those deposits." A little consideration will give the reason and point to a knowledge of solubilities and the interaction of salts of differing solubilities. This application appeared the only technological one till the other day Lewkowitsch, in a symposium on "Soap," held in New York, reminded his hearers of the part Chevreul played in the science of soap making, and how even his profound generalizations on hydrolysis were disregarded, and forgotten even.

It seems abundantly clear that adequate and scientific control of technical operations, and that is the only control worth having in these competitive times, can be secured by understanding the conditions under which the best results, or, for the matter of that, inferior ones, are obtained. Every now and then things go wrong under most experienced hands. Why ? Probably because the operator or supervisor knows too little—or not enough. He may have been unobservant during former procedure, and some point of temperature, motion, rate of mixture, dilution, or some small yet important factor was overlooked. Only observation and deduction can cope successfully with this often irritating and always uneconomical condition. Broadly, one may put it that no business is too small to be conducted on something like regular principles. Certainly no large business can in these days be conducted otherwise, and it may be doubted whether the vaunted superiority of our national rivals arises from individual superiority of brain, muscle, or power of adaptation, or to an inculcated discipline, first of the body, then of the mind, based on training from the earliest days by a simple, but thorough instilling of elementary knowledge, superadded to by a secondary training in the principles underlying the chief departments of knowledge, and supplemented by the need of reaching a high level of attainment, to shorten military service, to secure professional advancement and social class distinction, which are powerful incentives to the ambitious. One may honestly believe that compulsory military service would alone alter the whole disciplinary state of mind of this land of ours, particularly if with it that discordant element of creeds rather than morals could be treated on the lines of common sense and national good. But the practice is almost criminal, of cutting a young man straight off scientific work at eighteen to twenty-one years old. Then, while the majority think they "know," is the time for building on the foundations laid. Five years is not too much, certainly three or four with post-graduate work. Then we should reap good. With this, however, scientific knowledge would be eminently necessary, and that knowledge is one of principal fundamental truths.

For a few moments let us survey those principles necessary for modern success in applied research. Rule of thumb is done for. The simplest expression of scientific principle for an ordinary chemical technologist is Dalton's *Laws of Chemical Combination and Atomic Theory*. It should be emphasized in these days,

when the constitution of matter is yet controversial, that Dalton, the pride of Manchester, never claimed that he had propounded a theory of matter ; he founded a "chemical" atomic theory as distinguished from the "dynamic," "in which there is no limit placed on the divisibility of matter, and, therefore, no finite particles exist, and all we observe is explained by attractions or repulsions." This great man was a true researcher. A "side-light" on John Dalton, lecturer on pharmaceutical chemistry, by your Local Secretary, Mr. Kirkby, will be found in *The Pharmaceutical Journal* of February 27, 1904, and should be read by every pharmacist. How ? Why ? Wherefore ? were constant inquiries of Nature, and he was not contented until his queries were answered satisfactorily. Investigation has proceeded. Newer observations have placed old facts and explanations in different positions, and to-day some of the newer technologists are concerned at the lack of knowledge and want of appreciation of the "very latest" regarding "particles," "atoms," "molecules," "ions," "electrons" among the older sort. It matters little if "truth" is ascertained and sound bases for technical work established.

It must not go unsaid that no one can successfully conduct research, scientific or technical, without fair acquaintance with the current theories in chemistry and the necessarily allied subjects. The investigator never knows at what point light may be necessary ; indeed, his most earnest cry is for "Light, more light !" Arrhenius, the eminent director of the Nobel Institute at Stockholm, asks the question, "What is the characteristic feature of a theory ?" Some would reply, "A theory is something impractical." Nothing could be more incorrect. It is just the contrary. A theory should account for all the known facts at the time. The ancients pursued their experiments quite as much in the hope of establishing causes as for the special object in view, and many of them were the pharmacists of that day, and as such we owe them thanks.

The volume of experimental demonstration and indispensable deduction therefrom has increased, and will increase from month to month, therefore the necessity for that educational grounding in principles without which we are groping in the dark and not searching in the light. One may remark that a knowledge of some mathematics is absolutely necessary to any adequate comprehension of the foundations of technical progress on scientific lines, that is, clear thinking in the mathematical way ; with

precision. How else can any differentiation of the laws and theories of Lavoisier, Mendeléeff, Provost, Priestley, Davy, Faraday, Boyle, Gay Lussac, Avogadro, Maxwell, Ampère, Berzelius, Helmholtz, Van 't Hoff, Le Bel, J. J. Thompson, Rutherford, Berthelot, not to mention many others in all lands, and Emil Fischer, whose study of the polysaccharides, the isolation of which led to the famous generalization, that an enzyme must possess a similar configuration to the polysaccharide which it is capable of hydrolyzing? Fischer graphically pictured this relation as analogous to the key and lock. As the result of this work the fact was demonstrated that alcoholic fermentation by yeast of any of the more complex sugars, such as maltose, is preceded by hydrolysis into the simpler sugars. The elucidation of the chemistry of malt extracts followed, and consequent establishment of a definite constitution. The British investigators—A. R. Ling, editor of the Journal of the Institute of Brewing; Julian L. Baker, editor of the Journal of the Society of Public Analysts (both officers of sections of the Society of Chemical Industry), with Bernard Davis, Rendle, and others, have established the production of dextrose by diastatic action. Dextrose is shown to be an invariable constituent of commercial malt extracts, due to the fact that in their preparation there are two phases :—1. The starch is converted in the mash tun, after which the temperature is lowered and the reaction stopped. 2. The wort is pumped into the vacuum pan, where during evaporation diastatic action recommences, dextrose as well as maltose being produced. Prior to this work, if dextrose had been discovered in malt extracts it would have been regarded as an adulteration. One is led to this elaboration because malt extract is increasingly a product of the pharmaceutical laboratory, and about the standard for which even now considerable misapprehension exists. But to conclude references to investigators, one must mention the epoch-making synthesis of albuminoids of Emil Fischer, following that in the sugar group in 1890–91–93–95, in which F. W. Passmore collaborated, and that of caffeine in 1896. Whether synthetic foods will come, and be of use when they do, is in the future. One can but admire such work, and envy the possessor his faculties for the marvellous work which proved the identity of the polypeptides with protein, the material from which the organism builds up its most powerful agents, for as such the ferments or enzymes may be described without exaggeration.

"There is but one Fischer," just as Thorpe observed of Kelvin. One cannot here discuss the origin or history of the many synthetic remedies of foreign origin; their constitution, history, and therapeutic value are known; yet one may remark that there is no need to sit down and accept without any effort to originate through the medium of research, what is sent us from other lands.

The production of synthetic camphor ($C_{10}H_{16}O$) has much interest to-day among researchers. Like caoutchouc, it was foreshadowed long ago. The subject is too large to treat here, but let it be remembered that camphene is not camphor, as the structural formula shows (*Ph. J.*, March 2, 1907, 260).

One must beware of narrowing the definition of the term or word "chemist." The prefixing adjective industrial, academic, or professional, merely differentiates. The chemist one thinks of at the moment is the industrial variety, which, of course, includes the pharmaceutical. The pharmaceutical, often and naturally, develops into the manufacturing chemist, and they were never so numerous as to-day. It is but fair to scan the research position of pharmaceutical chemists. Reference to the B.P.C. collective index, which, by the way, ought to be on every shelf, if for reference only—and there are plenty in stock—will reveal names with which British scientific pharmacy may well be gratified, not to mention the names of those who have occupied the chair, and whose names are recorded in every *Year-Book*.

One desires to emphasize a point of great importance in view of the very decided criticisms made that there is a considerable amount of research talent "submerged," but it is submerged for the most part, because for the time present it is not at disposal. It is private and yet joint property; private to the researcher, joint with the employer. Where the researcher is free and independent he does not proclaim his doings from the housetop, at least, not those which are the equivalents of his daily bread. Then as to the employers, is it reasonable to suppose that they are insensible to the value of research and have no exponent of it? Can one conceive of any manufacturing or pharmaceutical chemist of eminence disregarding the necessity of research as an element of progress! Articles appearing in the journals are proof that the research talent not only exists, but is still active, and especially so in the manufacturing and wholesale houses, directly and indirectly connected with pharmacy and technological chemistry. If either class are unconcerned or unprepared, then the long-looked-for and impending changes in patent law, railway rates adjust-

ment, canalization, and readjustment of customs duties, with further adjustments as to industrial alcohol, not to mention the speedy and inevitable alteration of our defective educational system, will be of little use against the batteries of intellect, industry, and science in other hands.

The last occupant of this chair in this noble city of Manchester was our venerable friend, Mr. S. R. Atkins. Our very sincerest wishes follow him into retirement from public life, which he has adorned and honoured. His address, a sketch of scientific pharmacy in the Victorian era, was a model of brevity and beauty—which this certainly is not—and he will best be remembered to-day by quoting the peroration to that address in 1887: "I cherish the confident belief that the Manchester meeting of the British Pharmaceutical Conference will not merely promote generous sentiments, but specially that the papers which will be read and the discussions which follow will inspire us with noble aims and fresh endeavours."

"Who are the great?
Those who have boldly ventured to explore
Unbounded seas, and lands unknown before—
Soared on the wings of science, wide and far,
Measured the sun, and weighed each distant star,
Pierced the dark depths of ocean and of earth,
And brought uncounted wonders into birth;
Repelled the pestilence, restrained the storm,
And given new beauty to the human form:
Wakened the voice of reason, and unfurled
The page of truthful knowledge to the world.
They who have toiled and studied for mankind,
Aroused the slumbering virtues of the mind—
Taught us a thousand blessings to create—
These are the nobly great!"

Mr. J. R. Young (President of the Pharmaceutical Society) said it had been suggested to him, rather, he supposed, because of the office he held at that moment than from any idea of his special fitness or capacity for the task, that he should propose a vote of thanks to their President, Mr. Tyrer, for his address. It had also been suggested that upon that occasion particular brevity would be appreciated by the Conference, and he was sure that all would agree with that suggestion. They had given ample evidence that they were thankful for the benefits they had already received, and their willingness to be thankful for anything that might be coming in the future. They had reason to be thankful to Mr. Tyrer. The address he had given

them was a long one, but he might have given them one much longer. He had told them it was in his power to inflict a two-hours' address upon the Conference, but with his customary magnanimity he had been more merciful. They were, therefore, thankful to Mr. Tyrer for what he had given them and they were also thankful for what he had not given. It would be highly inadvisable to do anything in the way of criticising an address of such importance; indeed, it would take some days to adequately discuss a paper of such ability and such originality. It only remained for them—and he was sure they would do it most willingly—to thank their friend Mr. Tyrer for the trouble he had taken in the preparation and delivery of his address.

Mr. G. LUNAN seconded the proposition, and Dr. WALSH and Dr. SYMES having heartily supported the motion, it was carried with enthusiasm.

ANNUAL REPORT OF THE EXECUTIVE.

Mr. PECK presented the annual report of the Executive, as follows:—

"There have been several meetings of the Executive during the past year. Many matters of interest to the Conference have been discussed, and much important business transacted. At the last annual meeting it was proposed and carried by a large majority that the subscription be increased to 10*s.* 6*d.*, and that this recommendation should go forward to the Executive Committee for their consideration. This matter was carefully thought out in committee, and it was decided that the notice *re* subscriptions be redrafted and the request for subscriptions be for a minimum of 7*s.* 6*d.*, but as that sum was insufficient to meet current expenses the Executive Committee strongly urge upon members a voluntary subscription of larger amount. At a subsequent meeting it was decided to issue bankers' orders, which it is hoped that members will make use of. The local corresponding secretaries throughout the country have been communicated with during the year, and the Committee desire to thank them for their sustained interest. On November 22 of last year a special meeting of the Executive was held to consider the advisability of affording facilities at the meetings of the Conference for the discussion of ethical and political subjects, so far as they relate to the practice of pharmacy. The matter was thoroughly discussed, and it was decided by a large majority

to adhere to the present plan of limiting the subjects for papers to those dealing only with science as applied to pharmacy. We wish to draw the attention of members to the research list, which contains many problems awaiting solution, and we would again urge that more effort be made to work them out. We would remind members that a considerable sum of money is in hand to be used as grants to those undertaking research work. We are glad to be able to report that there is no longer a deficit upon the General Index Fund, and we would again ask those members who have not acquired copies of the volume to do so without delay. We wish to heartily thank the various cities and towns which year by year invite the Conference and entertain the members so well, but as the main reason of the Conference meeting is scientific, we sincerely hope that the smaller towns who would be unable to provide entertainment on an equal scale will not upon that account be deterred from issuing invitations. Since the last annual meeting sixty-four candidates have been elected to membership, twenty have resigned, and nine died. Among the latter we wish to mention the name of Harold Wilson, who was at one time a member of the Executive.

"Mr. J. O. Braithwaite has again been appointed Editor of the *Year-Book*, and reports that the MS. of the new volume is well in hand.

"Your Committee learnt with great satisfaction that the Biennial award of the Hanbury Gold Medal has this year gone to Mr. David Hooper, F.I.C., F.C.S. It gratefully recalls the valuable services he rendered the Conference during the eleven years he acted as Hon. Colonial Secretary for Madras, and the many useful papers contributed by him to its annual meetings.

"We are glad to be able to report that we have some twenty papers to be read, showing that the interest in the Conference meetings is well maintained."

Mr. G. Claridge Druce proposed the adoption of the report, and alluded to the satisfactory increase in the number of members. He thought the meeting had begun exceedingly well.

Mr. W. Giles seconded, remarking that the report showed that a very large amount of work had been done by the Committee during the past year. He thought it was a great advantage to every pharmacist carrying on business to become a member of the Conference.

The report was adopted.

Financial Statement.

Mr. J. C. Umney (Treasurer), in presenting the financial statement, said various economies had been affected in the *Year-Book of Pharmacy.* There had been an increase in the subscriptions, and while last year they had a liability of £111, that day their liability was only £9 odd.

Mr. Wells proposed the adoption of the report, and Mr. G. S. Woolley seconded.

The report was adopted.

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30, 1907.

The British Pharmaceutical Conference.

1906.	Dr.	£	s.	d.	£	s.	d.
July 1.	To assets forward from last year—						
	„ Cash at Bank	95	6	0			
	„ „ in Secretary's hands	0	12	1			
					95	18	1
1907.							
July 1.	To Members' Subscriptions	350	8	0			
	„ Amount received for "Index"	1	13	0			
					352	1	0
	„ Birmingham Subscription (Balance of Fund)	8	1	0			
	„ Amount received from Birmingham for Pink Circular	5	0	0			
					13	1	0
	„ Sale of *Year-Book* by Publishers . . .	12	0	0			
	„ Sales of *Year-Book* by Secretary . . .	3	10	0			
					15	10	0
	„ Advertisements in *Year-Book*	75	5	6			
	„ Sale of Formulary	1	0	0			
					76	5	6
	„ Liabilities on Open Accounts—						
	Butler & Tanner	26	19	0			
	Due to Assistant Secretary for Salary and Rent for one quarter, ending June 30 .	13	15	0			
					40	14	0
	„ Bell and Hills Fund				24	6	2
					£617	15	9

Deficit, July 1, 1907, is £9 16s. 10d.

	£	s.	d.
Viz.: Liabilities . . .	40	14	0
Assets . . .	30	17	2
	£9	16	10

		£ s. d.	£ s. d.
1906. July 1.	CR.		
By Bell and Hills Fund from last year			25 1 7
1907.			
,, Expenses of *Year-Book* for 1906—			
,, Printing, Publishing, and Binding		144 4 3	
,, Banding and Parcelling		3 10 8	
,, Posting and Distributing		13 5 8	
,, Advertising, £2 8*s*., Publishers' charges, 1*s*.		2 9 0	
,, Commission on Advertisements		18 16 4	
			182 5 11
,, Editor's Salary			75 0 0
,, Publishers' Commission on Sale of "Formulary"			0 2 0
,, Sundry Expenses—			
Assistant Secretary—Annual General Meeting		10 0 0	
Assistant Secretary's Salary for one year to date		45 0 0	
Rent of Office		10 0 0	
Postages, £14 18*s*. 1*d*.; Editor, 15*s*. 1*d*.		15 13 2	
			80 13 2
,, Printing and Stationery—			
McCorquodale & Co.		5 11 3	
Nisbet and Son		1 0 9	
Editor		0 6 1	
			6 18 1
,, Petty Cash		5 2 5	
,, Foreign Journals for Editor		4 1 6	
,, Bank Charges		0 6 6	
			9 10 5
,, Liabilities of last year, since paid—			
Butler & Tanner		190 18 5	
McCorquodale & Co.		2 14 0	
Assistant Secretary's Salary		13 15 0	
			207 7 5
,, Cash in Secretary's hands		0 11 7	
,, Balance at Bank		30 5 7	
			30 17 2
			£617 15 9

The Bell and Hills Fund.

		£ s. d.	£ s. d.
1906. July 1.	To balance from last year	25 1 7	
	,, One year's Dividend on Consols	8 11 0	
			33 12 2
Aug.	By Kimpton's Account for Books		9 6 5
			£24 6 2

Assets—
In account with British Pharmaceutical Conference.
£360 2½ per cent. Consolidated Stock.

The British Pharmaceutical Conference Research Fund.

		£ s. d.
1906. July 1.	To Balance	38 5 0

Examined and Found correct,

J. W. Bowen,
W. Prior Robinson.

July 7, 1907.

Reception of Delegates.

The President called on Mr. White to read the list of delegates, which was as follows:

Pharmaceutical Society of Great Britain.—The President (Mr. J. R. Young), Vice-President (Mr. J. F. Harrington), Messrs. Cross, Gibson, Gifford, Hobbs, and Newsholme. *North British Branch.*—Chairman (Mr. G. Lunan), Vice-Chairman (Mr. J. P. Gilmour), Messrs. Cowie, Currie, Giles, Sutherland, and J. Tocher.

Pharmaceutical Society of Ireland.—President (Dr. Walsh), Vice-President (Mr. J. Smith), Messrs. Beggs, Golden, Hardy, Wells, and Watson.

Aberdeen Pharmaceutical Association.—Messrs. W. Giles and W. F. Hay.

Bradford Chemists' Association.—Messrs. A. Hanson and Silson.

Bristol Chemists' Association.—Mr. H. E. Boorne.

Cambridge Chemists' Association.—Mr. E. S. Peck.

East Aberdeenshire Chemists' Association.—Mr. J. F. Tocher.

Edinburgh Chemists' Assistants', and Apprentices' Association.—Messrs. Cowie, Duncan, Hill, and Rowland.

Exeter Chemists' Association.—Mr. H. W. Gadd.

Forfarshire Chemists' Association—Mr. Malcolm Macfarlan.

Leeds Chemists' Association—Messrs. F. W. Branson, Beacock, Pilkington-Sargeant, Worfolk, and Bentley.

Leicester Chemists' Association.—Mr. Burford.

Liverpool Chemists' Association:—Messrs. A. C. Abraham, Cowley, W. P. Evans, Marsden, Shacklady, Symes, and Wyatt.

London Chemists' Assistants' Association.—Messrs. Arrowsmith and Paterson.

London Chemists' Association.—Messrs. Holding, Idris, and J. C. Umney.

Manchester Pharmaceutical Association.—Messrs. G. S. Woolley, Kemp, Kirkby, Kidd, Pidd, Grier, and Lane.

North-East Lancashire Chemists' Association.—Messrs. Gifford and Hindle.

North Staffordshire Chemists' Association.—Messrs. E. Jones, Bentley, and Cornwall.

Nottingham Chemists' Association.—Messrs. Adamson and Middleton.

Oxford Chemists' Association.—Messrs. Bellamy and Dolbear.

Sheffield Pharmaceutical and Chemical Society.—Messrs. Ant-

cliffe, Carr, Jackson, Squire, Newsholme, Pater, Appleton, and Williams.

Stockport Chemists' Association.—Mr. J. C. Arnfield.

Western Chemists' Association (London).—Messrs. Bowen, Cofman, White, and Martindale.

The reading of papers communicated to the Conference was then proceeded with.

FURTHER NOTE ON THE CHLOROFORMS OF ACONITE AND BELLADONNA.

By R. Wright, F.C.S.,
Pharmaceutical Chemist.

During the winter of 1902 I carried out a series of experiments on the above-mentioned preparations, the results of which were communicated to the Bristol Conference the following year.[1] It was shown that a preparation made either by direct percolation of the powdered root with chloroform, or by the method of the Conference Formulary, contained only a very small fraction of the available alkaloids, and that by varying the conditions and working with mixtures of chloroform and absolute alcohol much better results could be obtained. The process finally recommended consisted in percolating the finely powdered root, previously moistened with a menstruum consisting of seven volumes of chloroform and one volume of ammoniated absolute alcohol, and firmly packed in a conical percolator, until a 1 in 1 percolate had been obtained. By this process it was shown to be possible to obtain preparations containing, in the case of belladonna, from 60 to 70 per cent. of the available alkaloid, and in the case of aconite from 70 to 80 per cent. and even more. In working the process, however, it was found that there was a considerable waste of chloroform in the damping and packing of the powder; and the latter operation was rendered very unpleasant owing to the rapid diffusion of the ammoniated chloroform into the air. These constituted distinct objections to the process, and when a modification of the formula was introduced into the B.P. Codex by means of which the above-mentioned difficulties were avoided, I immediately resolved to test the value of the new process by strictly comparative experiments between the two.

[1] *Year-Book of Pharmacy*, 1903, p. 589, *et seq*

The details of the method given in the "Codex" are as follow :—

Aconite or Belladonna Root, in No. 60 powder . .	100·00
Solution of Ammonia.	25·00
Absolute Alcohol } Chloroform . . } of each a sufficient quantity.	

Moisten the powder with the solution of ammonia and set aside for twenty-four hours. Transfer to a percolator and percolate with a menstruum consisting of one of absolute alcohol to seven of chloroform until 100 of percolate is obtained.

Determination of the Alkaloids in Chloroform of Belladonna.

Considerable difficulty was experienced in working any of the ordinary shaking-out processes, chiefly owing to the emulsification of the chloroform employed as solvent. The best results were obtained with the following modification :—"Introduce 20 mils. into a clean dry bottle, fitted with a good cork, add 1 mil. glacial acetic acid, and mix, then add 20 mils. distilled water. Shake gently, withdraw the cork, then place the bottle in water at 70°C. to 80°C., and allow to stand until separation is complete. Transfer to a separator, draw off the chloroformic layer, and filter the acid solution through a plug of cotton wool into a second separator. Repeat the washing of the chloroform twice more, using for the second and third operations 0·5 mil. glacial acetic acid with 20 mils. distilled water, and transferring each of the separated acid solutions to the filter. Reject the exhausted chloroform, and to the mixed acid liquors add T.S. potassium carbonate until the liquid is distinctly alkaline to litmus paper, then extract the alkaloids with 10+5+5 mils. chloroform. Bulk the latter solutions and shake out with a mixture of 5 mils. diluted sulphuric acid, B.P., and 25 mils. distilled water applied in three equal and successive portions. To the mixed acid alkaloidal solutions add a slight excess of ammonia, and shake out the alkaloids with 10+5+5 mils. chloroform. Draw off the fractions of chloroform into a tared platinum dish, allow the chloroform to evaporate, and dry the alkaloids by exposure over a water-bath until the weight is constant. The gravimetric results are checked by titration, but if the alkaloid is colourless the gravimetric and volumetric figures will closely correspond.

The two competing processes for the production of the preparation were tried side by side on two commercial samples of

belladonna root, and the products assayed by the process outlined above.

The following figures indicate the proportion of alkaloids in grammes contained in 100 mils. of each :—

No.	Wright's Process.	"Codex" Process
1	0·115	0·268
2	0·177	0·402

In working on the first sample of the root percolation was continued until a second fraction (1 in 1 w/v) had been obtained. The alkaloidal content of these fractions was 0·06 per cent. and 0·004 per cent. w/v respectively.

The results prove that the "Codex" process is far superior to the other, and it is evident from the small amount of alkaloid contained in the second fraction of percolate that the exhaustion of the drug is practically complete.

Determination of the Alkaloids in Chloroform of Aconite.

The analytical process employed for chloroform of belladonna was found unsuitable for use in the case of aconite, and was therefore varied as follows :—Ten mils. of the sample was evaporated to dryness in a dish over a water-bath, the residue taken up with 2 mils. 5 per cent. potassium hydroxide and 10 mils. distilled water, and transferred to a separator, the dish being rinsed with a little more water and the rinsings run into the separator. Five mils. dilute sulphuric acid, B.P., was added, and the mixture shaken up with 10+5+5 mils. of chloroform in turn. The latter was drawn off into a second separator and washed with a little acidulated water, the washings separated and added to the contents of the first separator. A very slight excess of ammonia was added, and the alkaloids extracted with 10+5+5 mils. chloroform. From the mixed chloroformic solutions the alkaloids were shaken out with a mixture of 5 mils. diluted sulphuric acid, B.P., and 25 mils. distilled water, used in three portions. The acid solutions were drawn off in turn, mixed, an excess of ammonia added, and the alkaloids extracted as before. This process of purification is repeated, if necessary, until the acid solution is colourless, when the alkaloids are finally shaken out with chloroform, the latter distilled off and the residue dried over a water-bath, the weight being taken when constant.

As in the case of the chloroform of belladonna, two samples of the preparation were made by each of the competing processes

from good specimens of the official root, and the alkaloids determined by the method given above. The results shown below indicate the amount of alkaloids in grammes contained in 100 mils. of the preparation :—

No.	Wright's Process.	"Codex" Process.
1	0·158	0·405
2	0·330	0·355

In operating on the first sample percolation was continued until a second fraction of percolate, equal in volume to the first, had been collected in each case. The proportion of alkaloids in these fractions was determined, the respective amounts, expressed in grammes per 100 mils., being as follows :—Wright's process, 0·022 ; "Codex" process, 0·020.

The results obtained prove without any doubt the superiority of the "Codex" process whether applied to aconite or belladonna root. It takes out practically all the alkaloids quickly, and with very little waste of menstruum. The method formerly proposed by me gives good results provided that certain conditions as to fineness of powder, firmness of packing in the percolator, etc., are strictly fulfilled, but the successful working thereof depends too much upon the skill, patience, and attention of the worker to constitute it a satisfactory process for general use.

Mr. W. A. H. Naylor said this question had formed the subject of research by one or two members connected with that Conference, and it was then shown what an imperfect solvent chloroform was under the conditions specified. Mr. Wright showed a short time ago that the introduction of alcohol was a step in the right direction, so far as the accomplishment of the contemplated object of withdrawing the alkaloid from the root was concerned. The question, of course, might be considered from another aspect—as to whether the introduction of so much alcohol entitled the preparation to be called chloroform of belladonna or not. It was, of course, well known that belladonna root varied very much in respect of the percentage of alkaloid, and the preparation made by the "Codex" process would contain more colouring matter than the old preparation. He understood there was a variation of colour, and that was a matter of some importance in dispensing. He thought there could be very little doubt that the part that alcohol played in association with chloroform was not simply that it enhanced the solubility of the

chloroform, but that it rendered interpenetrable the chloroform, and by that means, of course, the alkaloid was more easily withdrawn. Another interesting point, and the author of the paper was to be congratulated upon it, was that it had been pretty clearly shown now that they had at any rate reached a point where the minimum proportion of alcohol had been reached.

Dr. McWalter having investigated the therapeutic activity in a very humble way, said that the results found by the author of the paper rather inclined him to be pleased with the results of his own research. Briefly, they were these: Medical men always knew that belladonna and aconite were extremely useful for relieving pain; and, in the opinion of the great mass of the general public the principal accomplishment of the doctor and the chemist was to allay pain. When a person was in pain he wanted to be relieved, and he did not inquire the wherefore. He was attracted by a statement in Squire's *Companion* that chloroform might be used instead of alcohol for the liniment. He tried the preparation, and found that it not only was not stronger than either belladonna liniment or chloroform, but was less strong than the mixture of both. It was obvious from the paper that this was due to the lack of alkaloids in the preparation.

Mr. F. H. Alcock asked whether these preparations were much in demand; if so, why? He questioned whether they were actually preparations of belladonna and aconite, since the alkali disturbed the natural constitution of the alkaloids contained therein. The question should be settled by a physiological test, for after all, that was the one to go upon. He fancied that, in Mr. Wright's process, which gave less alkaloid than the "Codex" process, and which did not use water, there was probably hydrolysis of the alkaloids, which, although isomeric, maybe yielded up in greater proportion by the presence of the water. These preparations were the forerunner of the use of methylated preparations, because some M.P.'s were formerly much concerned with the expense of their lumbago liniments, and Mr. Squire suggested that methylated products would be cheaper, and it was so arranged. The emulsification so troublesome to the method of assay is probably due to the presence of fats and oils extracted from the roots forming, with alkali, soaps, which introduced the very diabolus in the process. The addition of alcohol mitigated the nuisance, and could be recommended. He had again to complain that students found difficulty with processes which included the using of strong acid, and subsequent dilution

of the same; it would be easier for them to have prescribed a greater quantity of a weaker acid, and the same remark applied to absolute alcohol, a very expensive thing, that if it has subsequently to be diluted with water the cheaper diluted alcohol is much to be preferred. Finally, the variation of colour in these as, indeed, all preparations, often served as a criterion of the strength of it, but if no colour implied inferiority, then the addition of a little of that dark-coloured syrupy-looking colouring agent was requisitioned, and all was well. One very much feared, since coming to Manchester, that something would happen that might debar Mr. Wright from further giving such excellent papers. One only hoped that if it was true it would not be for long.

Mr. E. QUANT asked why the liquid extract of belladonna should not be used for the extemporaneous preparation of a chloroform of belladonna.

Mr. W. H. LENTON thought that standardization of the preparation was of the greatest importance.

Mr. J. DOLBEAR remarked as to the frequency of prescriptions of the chloroforms of acconite and belladonna. He pointed out that while he had never seen chloroform of aconite prescribed, chloroform of belladonna was prescribed about once a week, nearly always in combination with the liniment of belladonna.

Mr. EDMUND WHITE said that in many of the hospitals a mixture of the liniments of aconite or belladonna with chloroform was employed instead of the chloroforms. That proportion of chloroform varied from 1 to 6 to 1 in 8.

Mr. WRIGHT, in replying upon the discussion, dealt first of all with the question of chlolorform of aconite and chloroform of belladonna as galenical preparations. As Dr. McWalter had said, the prime object in the use of a preparation of this character was the relief of pain, and they wanted in chloroform of aconite or chloroform of belladonna a preparation which was volatile, as it was used as a pigment. They also wanted a preparation which should be active, so that it would answer the purpose for which it was intended, and they also wanted a preparation which could be mixed with oils. These were the three requisites in the chloroforms. He mentioned that Peter Squire originated the idea of belladonna root percolated with chloroform *per se*. When he took the matter up the only fault he found was that it was weak in alkaloids. With regard to the point raised by Mr. Alcock, he would like to say that criticisms which had been offered

as to the hydrolytic action of water did not apply to his original process, because he carefully abstained from using water at all; he employed chloroform and ammoniated absolute alcohol. The object he had in view was to get a preparation which would be as volatile as possible, and such a preparation was obtained by means of the new "Codex" process. The chloroforms mix with oils such as camphor liniment without any separation whatever. With regard to the question raised by Mr. Naylor, and which was rather important, he was afraid the colour would vary according as the preparation was made from different samples of belladonna root. That was a matter which told to a certain extent against the "Codex" formula, but not nearly so much against his own original formula. In regard to Dr. McWalter's criticism, it bore out as the result of experiment the statement that the alkaloid was not taken out by Squire's original process. He thanked Mr. Alcock for his friendly criticism, and thought that the solutions which had been referred to would be kept at hand, to be used when required. His process was specially designed to exclude the presence of water. In reply to Mr. Quant, Mr. Wright said the objection to a preparation made from a liquid extract was that a clear mixture could not be obtained, owing to the very slight solubility of weak spirit in chloroform. Five ounces of chloroform would not take up more than half a drachm of 90 per cent. alcohol.

WHAT IS OIL OF JUNIPER?

BY JOHN C. UMNEY, F.C.S., AND C. T. BENNETT, B.SC.

There appears to be as much difference between the juniper oil distilled on the Continent, principally in Hungary, from the freshly picked berries (possibly not entirely free from leaves and twigs), and the oil distilled in England from the berries which have naturally become partially dried, as there is between the patent still whisky and the malt whisky, which has been so much in evidence latterly in the courts of law.

There is also doubt as to whether the valuable properties of juniper oil are due to the terpene constituents which one finds in a larger proportion in the imported oil distilled in Hungary, or to the heavy constituent, cadinene, which one finds in the

greater proportion in the English distilled oils, and the presence of which so modifies the physical characters of the oil.

Briefly the characters of these two classes of oils may be set out as under :—

	English	Foreign	U S P 25°C
Specific gravity .	0·870 to 0·900	0·860 to 0·880	0·860 to 0·880
Optical rotation .	—10° to + 1°	—3° to —12°	—
Refractive index .	1·4820 to 1·4880	1·4770 to 1·4830	—

Juniper Oil Fractionation.

	English		Foreign.	
	New, Per cent	Old, Per cent	Hungarian, Per cent.	German, Per cent
Below 160° C. . . .	14	14	22	31
,, 165° C. . . .	40	—	49	—
,, 170° C. . . .	52	—	60	—
,, 175° C. . . .	60	—	70	—
,, 180° C. . . .	65	44	72	45
,, 185° C. . . .	68	—	74	—
,, 200° C. . . .	75	—	85	—
,, 210° C. . . .	—	54	—	62
,, 265° C. . . .	—	76	—	74

Side by side are placed the fractionation figures of type samples of these oils, and it will be seen that the variation in their composition is very considerable, and that such variation must be due to a very great difference in the characters of the oils, and if the medicinal value of the oil be due to one constituent then it must be that the medicinal value is widely different in the two classes of oil.

What, therefore, should be sold as juniper oil for medicinal purposes ?

The oil distilled in Britain was alone official in the 1885 Pharmacopœia, but the characters and tests of the British Pharmacopœia of 1898 are very broad indeed.

Oils of both classes might easily fall within the B.P. limits for specific gravity, and if freshly distilled fulfil the requirement as to solubility, and yet the proportion of pinene would probably vary from 30 to 65 per cent., according as the specific gravity was at one extreme or the other.

With these premises, therefore, it must be obviously very difficult to say what is juniper oil, and it is certainly necessary that,

if official in a subsequent Pharmacopœia, some attempt should be made to more clearly define the oil, based, if possible, upon experiments as to the valuable medicinal constituent or constituents of the oil. If pinene be of value, then obviously the light oils, which latterly have received such condemnation, may be the more valuable. If the heavier fractions have medicinal properties, then it may be desirable that the oil should be distilled from the berries that have become partially dried, or that the imported oil should be fractionated so as to remove from it a considerable proportion of pinene, which may be undesirable and possibly inert.

In our present knowledge of the position, and until experiments have been conducted on the separated constituents of juniper oil, it would appear that the requirements of the British Pharmacopœia should be fairly broad ones, and we would suggest as limits into which, in our experience, oils of good quality fall, characters and tests somewhat as under:—

Specific Gravity, at 15°C., 0·860 to 0·885.

Optical Rotation in 100 Mm. tube, $-3°$ to $-12°$.

Fractionation not more than 60 per cent. should distil below 165°C.

Refractive Index.—The refractive index of the oil itself is of little value, but when applied to the higher fractions it is a useful constant. In our experience the residue, after distilling 80 per cent. of the oil, should have a refractive index of at least 1·4900, indicating a normal proportion of sesquiterpene.

Solubility.—It should be soluble when freshly distilled in 10 volumes of 90 per cent. alcohol, but the solubility diminishes with age, owing to oxidation, the specific gravity increasing accordingly; hence the solubility test alone is of little value in judging the purity of an oil.

It should be noted that English oil is usually less soluble than foreign oil, on account of the higher proportion of sesquiterpene.

It is perfectly clear that it is difficult in many cases to say definitely whether an oil is a genuine distillate or whether it has been fractionated to remove the less soluble sesquiterpene; and it is practically impossible to decide from analytical figures to what extent, if any, rectified oil of turpentine has been added to a given sample.

NOTE ON JUNIPER OIL.

By F. C. J. Bird.

It is a matter of common knowledge that, excluding the so-called oil of juniper wood, admittedly factitious, two varieties of oil of juniper are met with in commerce, each purporting to be genuine oil of juniper berries and to fulfil the requirements of the British Pharmacopœia. The one, of foreign origin, is very generally sold as B.P., whilst the other, distilled in England from imported partly-dried berries, commands a very much higher price, and is consequently in less frequent demand. The genuineness of a sample of juniper oil, very similar in its characters to the foreign B.P. oil so generally sold, has quite recently been called in question in a court of law, and the subject has given rise to considerable difference of opinion. An explanation of the great diversity in physical character of the two varieties of juniper oil is therefore very desirable.

The following analyses will illustrate the difference in composition between Ol. Junip. Ang. and Ol. Junip. Exot. The former contains a much larger proportion of the high boiling constituent "cadinene" than the latter, in which the terpene "pinene" predominates. No. 1 oil was distilled in London, and No. 2 was an imported Hungarian oil guaranteed genuine.

=	No. 1 Ang.	No. 2 Exot.	B.P. Characters and Tests.
Colour	yellowish	nearly colourless	colourless or pale greenish yellow
Specific gravity . .	0·896	0·873	0·865 to 0·890
Rotation (100 Mm.) .	—2·3	—1·6	—
Solubility in 4 vols. 95 per cent. alcohol	considerable turbidity	slight turbidity	slight turbidity
Refractometer figure at 40°C.	78	63	—

Distillation Test.

155° to 160° C. . .	12 per cent.	37 per cent.	—
160° to 180° C. . .	35 per cent.	34 per cent.	—
180° to 255° C. . .	19 per cent.	10 per cent.	—
255° to 280° C. . .	22 per cent. residue.	10 per cent. residue.	—

It is hard to believe that any difference in the condition of the

berries at the time of distillation can account for such a marked variation in the composition of these two oils; and in order, if possible, to find some explanation, I obtained through the importer of the No. 2 oil some of the berries from which that oil was understood to be distilled. Time did not admit of working on more than a small quantity of the berries, but the distillate was a pale yellow oil giving the following figures:—

Specific gravity	0·875
Refractometer figure	76

Here we have an oil showing a refractometer number of 76 as against 63 given by an oil distilled in Hungary from the same berries, with the only difference that the berries may have been in the fresh condition. The significance of this will be better understood from a consideration of the following figures:—

Zeiss Butyro-Refractometer temp. 40°C.

	Refractometer Number.
Distillate from English oil of juniper (first fraction)	49
Distillate from Hungarian oil (first fraction)	51
Distillate from Hungarian new oil (first fraction)	53
American turpentine	55
French turpentine	56
Oil of juniper, B.P. Hungarian	63
Oil of juniper B.P. Hungarian, new	61
Oil of juniper, B.P. German, twice rectified	62
Oil of juniper, German rectified	58
Oil of juniper berries (English)	78
Oil of juniper berries, own distillation	76

I venture to suggest, as a possible explanation of the difference between the English and foreign oil, that whilst the English-drawn oil consists of the entire distillate from juniper berries, the imported article may be the lighter portion of the oil separated by re-distillation. This would afford a product free from colour and approaching the lighter limit of specific gravity in the B.P., and might also allow of a profitable disposal of the more odorous residue for flavouring purposes, concentrated or terpeneless oil of juniper being an article of commerce in Germany, and doubtless finding an extensive application in the manufacture of Hollands and other spirits. This is supported by the result of the steam distillation of some English oil which yielded 70 per cent. of a colourless oil, sp. gr. 0·868, very similar in odour to the foreign oil, and about 12 or 15 per cent. of an oil possessing a concentrated juniper odour which would form a valuable flavouring agent.

If this supposition be correct, then the "guaranteed genuine" of the distiller of foreign oil can only mean that the oil is distilled from juniper berries, and is free from admixture with turpentine; whether the oil consists of the entire distillate or not remains to be ascertained.

In the case already alluded to the condemnation of the sample was based chiefly on the refractometer figure, and it was certified to contain 68 per cent. of turpentine. The analyst found a difference of about 20 between the figure obtained with English juniper oil and turpentine, but only about 4 or 5 between that of the suspected sample and turpentine. (The figures reported were: —Turpentine 70, condemned sample of oil of juniper 74 or 75, standard sample of oil of juniper 90, temperature not given.) On reference to the table it will be noticed that the difference between the refractometer figure of turpentine and those of the samples of foreign oil is only from 5 to 7, so that the uncertainty often surrounding the interpretation of the refractometer figure can be readily understood.

It is difficult to learn anything respecting the distillation of juniper oil as practised on the Continent, and the inquiries I have made have had little result; but if any one is in a position to say if the oil is really fractionated in the manner which appears so probable, such information would be both valuable and of great interest.

From the lowest limits of specific gravity in the Pharmacopœia viz., 0·865, it almost appears as if it had been intended to include the lighter foreign oil (English distilled oil, I am told by a London distiller, never has a specific gravity of less than 0·871).

The present Pharmacopœia monograph on Ol. Juniperi certainly requires to be made more definite, the characters and tests being so framed as either to exclude with certainty all oils differing from the expensive English distilled oil, or to admit both the English and cheaper foreign oil, so that there may in future be no doubt as to what juniper oil is to be used in medicine.

Mr. J. Rutherford Hill said these contributions were singularly relevant to the purpose of the B.P.C. They dealt with that object of their constitution relating to the principle of the maintenance of a high standard of purity in medicine. The circumstances related by Mr. Umney interested him very much, and he looked upon it as an interesting sequel to the discussion which took place at the Conference at Birmingham last year,

on Mr. Liverseege's paper on the analysis of drugs. About twenty years ago a member of the Pharmaceutical Society in Scotland was proceeded against for selling salicylic acid containing creosotic acid, which had been detected in a research by Professor Charteris, of Glasgow University. The matter was referred to him, and he pointed out that there was no accepted standard for salicylic acid but the B.P. At that time the B.P. tests were wide, as are the tests of the oil of juniper, and, on the advice of the judge, the case was withdrawn. He ventured to remark last year at Birmingham that the B.P. was a standard under the Food and Drugs Acts, but it was not *the* standard. He also suggested the great need for a committee on standards and tests under the Food and Drugs Acts consisting of public analysts, medical officers of health, and members of the Pharmaceutical Society, and in that respect he would like to congratulate the Pharmaceutical Society and the two distinguished officers of the B.P.C. on forming part of that commission in the particular case referred to. That was a very sensible arrangement to make, because there ought to be a body of experts to whom might be referred debateable cases. With regard to oil of juniper, he could confirm the statement that the oil increased in density on keeping. He happened to have a sample of the oil forty years old, which was now so dense that it was almost syrupy in appearance, although it had been kept in a closed bottle. These papers also suggested that there might be a necessity for two standards. If research indicated that the light oil was the medicinally valuable one, then a standard would be required to specify it as the one for medicinal use, while another standard might allow the use of the heavy oil for industrial and manufacturing purposes. That was a principle of general application, as while the highest purity was necessary in medicine, a lower grade of many articles was better adapted for commercial use, and the sale of such grades should be permissible. The standards of the B.P. were intended to meet a special purpose, and a standard under the Food and Drugs Acts had quite a different purpose.

Mr. E. T. Brewis said he should like to add a word or two with reference to these two papers. With regard to English oil, his figures largely confirmed those given by Mr. Bird and Mr. Umney. Mr. Umney stated facts, and then left it—as he thought rightly—to the medical profession to say which of the two standards was medicinally useful—the lighter or the heavier one.

Foreign oil is a by-product rather than a normal distillate of juniper berries. He found, on examining the bulk samples of some sixteen to twenty batches of freshly distilled oils, in not one of these was the specific gravity lower than 0·871 or higher than 0·890, figures which agree fairly well with those of Mr. Umney. He found the rotation varied between $-4{\cdot}5^\circ$ and -11°. With regard to Mr. Hill's suggestions as to the use of the lighter oil medicinally and the heavier oils in the manufactures, he thought the latter were the more likely to be the medicinally useful ones. In some of the foreign oils the gravities are very much lower, and among the samples submitted to him in one case he found the gravity was as low as 0·859.

Mr. NAYLOR asked a question as to the difference between the oil from mature seeds, and that from immature seeds.

Mr. F. H. AILCOCK remarked that it was regrettable that these things "came out" in courts of law, and not, say, from the Pharmaceutical Society's Research Laboratories. Again, a new test is applied by the public analyst, and because the article does not conform with a test not recognized by the B.P. it is pronounced adulterated. It would be well to ask the committee of experts that when by a new test such as had been used in the oil of juniper case, viz., the oleo-refractometer, an instrument not recognized by the B.P. at all, a courteous note should be sent to the pharmacist acquainting him that his oil is not in accordance with the analysts' tests of purity; such is done in Birmingham, and rightly so. It should also be remembered that the retail pharmacist does not make his own oil of juniper, and it presses unduly upon him when such a *contretemps* arises. There are other things, such as cod-liver oil, as well as the salicylic acid incidents, and no doubt others may be in their mind, which will sooner or later come to be mentioned in the law courts and similarly disposed of.

Mr. A. SIMPSON said he had listened with great attention to the scientific discussions on the two papers on juniper oils, and pointed out that the whole of the reputation of juniper oil on the part of the public was based upon the oil of the wood which was described as spurious, and which oil was prepared from the wood and is nearly all turpentine.

Dr. MCWALTER alluded to the fact that oil distilled in England has the desired medicinal properties. In a new B.P. there should be included an oil rich in cadinene, which, he thought, possessed the principal medicinal activity of the oil.

Mr. Umney, in reply, said evidently there were considerable doubts as to whether the medicinal properties of juniper oil were due to pinene or cadinene, Dr. McWalter favouring cadinene and practising pharmacists present insisting that the reputation of juniper oil was based on the so-called oil of the wood. In connexion with the advisory committee which had recently decided on the merits of a recent juniper oil case, he had had a conversation with Sir Thomas Stevenson, one of the members of the Committee, as to what was the active principle of the oil, and Sir Thomas Stevenson replied to the effect that he had no definite opinion as to whether the properties were due to pinene or cadinene. If they wanted pinene they could have it, and if they wanted cadinene they could have it, but for pinene, why not have turpentine at once? If the General Medical Council would be good enough to indicate what they wanted, they, as pharmacists, would at once proceed to frame a series of tests to meet their requirements, which would be quite simple.

The President, in thanking the authors of the papers, said the recent departure in the appointment of a committee of experts was all for good. None of them claimed to know everything, and, therefore, he urged that the committee should be influential and changeable.

THE EXAMINATION OF CHROMIC ANHYDRIDE AND ITS SOLUTIONS.

By T. E. Wallis, B.Sc. (Lond.), F.I.C., Ph.C.,

Head of the Science Department, Technical Institute, Tunbridge Wells.

There are well-known processes by which chromic acid can be valued in terms of its oxidizing power, but there is no method for determining it acidimetrically. This paper is a report of work done in that direction; some remarks are also made respecting the action of heat upon the anhydride, and with reference to the preparation of the official solution.

The difficulty experienced in attempting to titrate a solution of chromic acid with standard alkali is due to the intense colour of the solution, and it is evident that if the colour can be destroyed without at the same time altering the acidity, it would be possible to successfully carry out the titration with alkali. The colour of chromic acid solutions is produced by the presence of yellow

CrO_4'' ions, and red Cr_2O_7'' ions; if, therefore, one can effectively remove these ions without altering the number of hydrogen ions, an acid solution that can be easily titrated will be produced. This end can be obtained by precipitating the CrO_4'' ions by means of barium chloride, when the following reaction takes place :—

$$BaCl_2 + H_2CrO_4 = BaCrO_4 + 2HCl.$$

The barium chromate is, however, soluble to a certain extent in the hydrochloric acid produced, but it can be completely precipitated by adding sufficient sodium acetate to replace the free hydrochloric acid by free acetic acid according to the following equation :—

$$CH_3COONa + HCl = NaCl + CH_3COOH.$$

It is evident from the equations that the amount of acetic acid thus produced is exactly equivalent to the chromic acid used in the first place, and by titrating the filtered liquid with standard alkali, using phenolphthalein as indicator, the quantity of chromic acid can be calculated.

In making qualitative tests for sulphates in the specimens of chromic anhydride used, in addition to the Pharmacopœia test, sulphates were sought for in the aqueous extract of the residue left after ignition, as recommended by Greenish and Smith in a paper dealing with the solubility of chromic acid (*P.J.*, June 4, 1902). In the case of the two pure specimens A and B, bought as free from sulphuric acid, no indication of sulphate was found by either method. In connexion with this test, my results do not agree either with the Pharmacopœia, which states that the residue left on heating has a "greenish-black" colour, or with the statement of Greenish and Smith, who say "we found the residue to be steel-black in colour" (*loc. cit.*). In every case, the residue obtained on heating was a green one, having the colour of ordinary chromium sesquioxide.

To make a determination acidimetrically, solutions were prepared containing in 100 Cc. about 5 Gm. of chromic anhydride, 13 Gm. of barium chloride, and 15 Gm. of sodium acetate respectively. Theoretically 1 Gm. of chromic anhydride should require 2·44 Gm. of crystalline barium chloride, and 2·72 Gm. of crystalline sodium acetate, so that the quantities used were slightly in excess of those required by theory. 10 C.c. of the chromic acid solution were put into a beaker, 10 C.c. of the barium

chloride solution added, and finally 10 C.c. of the sodium acetate solution, the precipitated barium chromate was filtered off, and the acetic acid in the filtrate determined by semi-normal sodium hydroxide solution. It was found preferable to add the barium chloride first and the sodium acetate second, since when the order was reversed, the precipitate showed a tendency to pass through the filter paper.

The quantity of chromic anhydride found by this method was in every case checked by titration against ferrous ammonium sulphate solution, using a chromic acid solution one-tenth the strength of that used for the acidimetric method. In the later experiments this more diluted solution was used also for the acidimetric titrations, since the time required for filtration was thereby very much reduced, and the accuracy of the results was not altered. The following figures were obtained for specimens of chromic anhydride shown to be free from sulphuric acid :—

	Percentage of Chromic Anhydride Specimen A	Percentage of Chromic Anhydride Specimen B
Acidimetrically by N/2 NaOH . .	99·6 .	99·16
By reduction with N/10 ferrous ammonium sulphate	99·8 .	99·3

If the amount of acidity found is greater than that due to the chromic acid indicated by the ferrous ammonium sulphate, the excess must be due to sulphuric acid present in the specimen as an impurity, and from the difference between the two titrations it should be possible to calculate the exact amount of the impurity. Accordingly, a solution containing known quantities of chromic anhydride and sulphuric acid was prepared, and then analysed by this method. The following are the results :

	Quantity put into 25 C.c. of the Solution	Quantity found in 25 C.c. of the Solution
Chromic anhydride . . .	1·1514	1·155
Sulphuric acid	0·1453	0·1427
Total	1·2967	1·2977

These figures were sufficiently good to show that the process could be employed to obtain an accurate quantitative analysis of mixtures of chromic and sulphuric acids. Some specimens, C and D, of commercial chromic anhydride, such as is commonly used for battery solutions, were next analysed by this method,

and the quantity of sulphuric acid present was also determined gravimetrically as barium sulphate in order to check the results obtained. These were as follows :—

	Quantity Used.	CrO_3 by Ferrous Ammonium Sulphate.	H_2SO_4 by Volumetric Method.	H_2SO_4 by Gravimetric Method.
Specimen C . .	0·5109	0·3065	0·1257	0·1286
Specimen D . .	0·5104	0·2905	0·1298	0·1294

These figures give the following percentage compositions for the two specimens of commercial chromic anhydride.

	Specimen C.	Specimen D.
Chromic anhydride	60·02 .	56·91
Sulphuric acid	24·85 .	25·39
Water (by difference)	15·13 .	17·70
	100·00	100·00

To show exactly how these results were obtained, the figures for one of the determinations are given in full :—5·104 Gm. of specimen D were dissolved, and made up with water to 100 C.c. ; 10 C.c. of this solution were mixed with 10 C.c. of barium chloride solution and 10 C.c. of sodium acetate solution, and the barium chromate filtered off. The filtrate was titrated with semi-normal sodium hydroxide, and required 16·92 C.c., corresponding to 82·87 per cent. of chromic anhydride.

Another 10 C.c. of the chromic acid solution were diluted to 100 C.c. with water, and titrated against ferrous ammonium sulphate, when 11·7 C.c. or 0·0597 Gm. of commercial chromic anhydride were found to be equivalent to 10·2 C.c. of decinormal ferrous ammonium sulphate. This corresponds to 56·91 per cent. of pure chromic anhydride. The excess, amounting to 25·96 per cent., shown by the acidimetric titration is due to sulphuric acid, and if multiplied by 0·98 it gives 25·44 as the percentage of sulphuric acid present.

The sulphate present in 0·5104 Gm. of the crude anhydride was precipitated as barium sulphate, which weighed 0·308 Gm., corresponding to 25·35 per cent. of sulphuric acid, an amount which agrees very closely with that found by the volumetric method.

A specimen of chromic acid of the Pharmacopœia obtained from a good drug house was next examined. When tested qualitatively in the two ways named above a considerable pre-

cipitate due to sulphates was formed. The volumetric analysis showed 90·23 per cent. of pure chromic anhydride and 3·99 per cent. of free sulphuric acid; a gravimetric determination of sulphates indicated the presence of 6·16 per cent. of sulphates reckoned as sulphuric acid. The gravimetric figure was therefore 2·17 parts in excess of the volumetric figure, and the explanation is that some of the sulphate present was in the form of a salt, which would not be indicated by the titration with alkali. Judging from the probable method of preparation, this sulphate was potassium sulphate, and potassium was accordingly sought for in the aqueous extract of the residue left on dry heating, and was shown to be present by producing a precipitate with platinic chloride. If the additional amount of sulphate indicated gravimetrically is worked out as potassium sulphate it gives 3·85 per cent.; the composition of this specimen of chromic anhydride (specimen E) is as follows:—

Chromic anhydride	90·23
Free sulphuric acid	3·99
Potassium sulphate	3·85
Water (by difference)	1·93
	100·00

Two specimens of Liquor Acidi Chromici were purchased from local pharmacists, and on analysis showed the following results expressed in percentages by weight; the requirements of the Pharmacopœia are put in a third column for comparison:—

	Specimen F	Specimen G	British Pharmacopœia
Chromic anhydride	18·555	19·58	25·00
Sulphuric acid (volumetrically)	1·081	1·84	—
Sulphuric acid (gravimetrically)	1·087	1·96	—
Water (by difference)	80·361	78·52	75·00
Specific gravity at 15°C	1·159	1·1856	1·185

Assuming that the solutions were made up according to the official directions, the specimens of chromic anhydride used must have had the following percentage composition:—

	Specimen F	Specimen G.
Chromic anhydride	74·22	78·32
Sulphuric acid	4·34	7·60
Water	21·44	14·08

From these figures it is clear that solution of chromic acid as ordinarily sold falls considerably short in chromic acid content, and also contains an appreciable quantity of sulphuric acid, hence emphasizing the necessity for introducing a method of assay into the Pharmacopœia.

Another striking fact brought out by the figures is that specimen G has the official specific gravity, and still falls short in chromic acid content. This immediately leads one to suppose that there may be an error in the statement of the Pharmacopœia as to the specific gravity of the liquor. In order to test the accuracy of this deduction, two solutions were prepared strictly according to the Pharmacopœia directions, and their densities determined by two independent methods, viz., by the specific gravity bottle and by means of a plummet* of glass, and the following results were obtained :—

Method for Specific Gravity	Specimen H	Specimen K.
By specific gravity bottle . .	1·2033	1·2099
By plummet	1·2088	1·2115

This gives at 15 C. an average specific gravity of 1·2084, a figure considerably in excess of that in the Pharmacopœia. The specimen K was also analysed acidimetrically, and showed a chromic anhydride content of 24·73 per cent., indicating that it had been correctly prepared.

Further experiments were made with a view to ascertaining how the mistake in the Pharmacopœia had arisen. A solution was prepared containing 25 Gm. of chromic anhydride in 100 C.c., and showed a density of 1·1710 by the plummet and 1·176 by the bottle, giving an average density of 1·1753. Another solution was prepared having as nearly as possible the Pharmacopœia density, the average density by experiment being 1·1848, which is as near to 1·1850 as it is practicable to get. On analysis this solution showed acidimetrically 22·22 per cent., and by oxidation of ferrous ammonium sulphate 22·5 per cent., or as an average 22·36 per cent. of chromic anhydride. From these results it is evident either that a mistake was made in calculation or, as is more probable, that an impure specimen of chromic anhydride was used in making the solution used in determining the specific gravity.

The following suggestions represent the practical bearing of this investigation upon the Pharmacopœia :—

(1) That for the words "greenish-black," used in the Pharmacopœia to describe the colour of the residue left after heating the anhydride, should be substituted "green."

(2) That in addition to testing the aqueous extract of the residue, left on dry heating, for sulphates as recommended by Greenish and Smith, it should be tested for potassium.

(3) To the tests under chromic anhydride might be added a quantitative test worded somewhat as follows :—To 0·1 Gm. of chromic anhydride add 3 C.c. of solution of barium chloride and 3 C.c. of solution of sodium acetate ; filter, and using phenolphthalein as indicator, titrate the filtrate with decinormal solution of sodium hydroxide, of which not less than 19·8 C.c. should be required. This would indicate a purity of at least 99 per cent.

(4) The figure given for the specific gravity of the official liquor should be changed from 1·185 to 1·208, and a quantitative test similar to that suggested above might be added to the official tests, so as to ensure the presence of 25 per cent. of chromic anhydride in the liquor.

(5) In view of the hygroscopic nature of the anhydride and the consequent difficulty in keeping it, it might be advisable to introduce a new formula for the liquor, which might be prepared as follows :—

Chromic anhydride . . .	1 oz.
Distilled water	a sufficient quantity.

Dissolve the chromic anhydride in sufficient water to give a solution having a specific gravity of 1·208.

Mr. R. Wright thought Mr. Wallis had contributed a very useful note. He added that he found chromic acid one of the most difficult things in the world to keep in an anhydrous condition.

Mr. Edmund White inquired if the author, in searching for sulphate in chromic acid, had reduced the acid to green chromium salt by means of alcohol before employing barium chloride. If the test were applied to the acid solution direct, a small quantity of barium sulphate would not be precipitated.

Mr. Alcock asked if the author had sought for nitric acid, for, on the authority of Professor Redwood, that was useful

in eliminating sulphuric acid from the precipitated chromic acid, and subsequently drying on porous tiles or smooth bricks.

Mr. NAYLOR said that as far as his experience went he thought that chromic acid absolutely pure from sulphuric acid had not been found, or, at least, up to four or five years ago. He had found it to contain as much as 20 per cent. of sulphuric acid, but that, perhaps, did not obtain to-day. It was no uncommon thing some few years ago to find chromic acid containing a very large percentage of sulphuric acid, even as much as 15 or 20 per cent.

Mr. WALLIS, in replying, said that in testing for sulphates he had not tried reduction with alcohol, but that heating the anhydride in a dry tube before testing for sulphates in the aqueous extract of the residue had practically the same effect in increasing the delicacy of the test. Nitric acid had not been sought for as an impurity. Chromic acid over 99 per cent. pure could be readily obtained at a reasonable price, and a limit of purity corresponding to 99 per cent. of chromic anhydride was not suggested with the idea that a pharmacist should be compelled to sell an article of that purity, but to enable him to satisfy himself that he was buying a reliable specimen for use in making the liquor, which, if made according to the suggested formula, would then give a solution answering to the Pharmacopœia requirements.

PHARMACY NOTES FROM VARIOUS PARTS OF THE WORLD.

BY W. HARRISON MARTINDALE, PH.D., MARBURG.

Some months ago it occurred to me that to attempt to reproduce some points of difference between pharmacy and therapeutics at home and abroad might form a paper of sufficient interest to communicate to the Conference. The following notes are the outcome of this idea. I have endeavoured to lay stress on preparations of local produce, and to draw attention to unusual names, modes of administration, strengths and dosages. I have to apologize for the "scrappy" nature of these notes, as the matter is difficult to condense into short form. For my purpose I have approached pharmacists and medical men in the various countries of Europe, Asia, Africa, Australasia, and the Western Hemisphere.

Austria.

The Engel Apotheke at Vienna forwarded me a long list of preparations recently prescribed.

British Honduras.

A preparation designated "Bay Sore Ointment" contains chrysophanic acid, for ringworm; Ess. Yerba Buena is Spt. Menthæ Sativæ; Lucas gum is olibanum, used to smoke out mosquitoes. Messrs. L. E. Cuevas and Co. also advise me that Masambred is Aloes Barb.; "Ofas," containing resorcin, boric acid, and lycopodium, is employed as a deodorant; "Peonia" is given to children for convulsions; its composition is asafœtida and honey; Turlington's Balsamito is equivalent to Tinct. Benz. Co., whilst carbon bisulphide, for the big ants, is sold as "Wee-wee Killer."

Canada.

The conditions of pharmacy and the requirements in Canada are so similar on the one hand to those of Great Britain, and on the other to those of the United States, that it occurred to me, in view of our familiarity, one might say our complete satiety with the methods of the United States, to condense the information as far as practicable, without forgetting to mention the assistance of Mr. Lloyd Wood, of Toronto, in sending me notes and labels. There are one or two of the latter on grained tin foil which are interesting.

Denmark.

Guided by a good pharmacist in the person of Herr Madsen, of Copenhagen, I am enabled to describe pretty fully pharmaceutical requirements outside those of the Pharmacopœias of 1868 and 1898. A new Pharmacopœia, by the way. has just appeared. I have dipped into a little book entitled *Pharmacopœia Nosocomii*, and have made some abstracts.

Bacilli containing 1 Gm. of croton oil, Linctus Expectorans with Antim. Sulphurat. as constituent, Mistura Flava having nothing whatever to do with Lotio Flava, P.B., Mistura Saleb quite distinct from Saleb of P.G., Mistura Saturnina as emmenagogue, and carrageen as a pill excipient; finally the employment of sublimate as a preservative in cocaine, eserine and atropine

solutions for eyework, are worthy of attention, though they are doubtless not all entirely new.

Amongst Remedia Praescripta, during a recent month or two, may be added Gytje—a kind of mud from the Norway fjords, used in balneology; the King of Denmark's cough mixture, Œsypus, which is unpurified sheep's wool fat; Ronnely Arsenical Water, "species" of different kinds, and Tallbarsolie—a distilled fir tree oil. The Danish language bears some resemblance to the German, but even with a knowledge of the latter some of the directions appended to medicaments are quite undecipherable.

An important label, which, as a matter of fact, one meets in other Continental countries, directs the number of times a medical prescription may be repeated.

As far as I know, powder papers, as used in Denmark and certain other countries, ready folded and imprinted with name of the contents and the chemist's name and address, are not extensively employed in this country. They are well worthy of emulation. Black paper distinguishes powders for local use from those for internal administration. Coming to small details, it may be mentioned that "Ormesukker" in Danish is confection of hips, "Spanskgrout" is equivalent to verdigris, and "Kaneldraaber" is cinnamon tincture.

I commend the *Haandkjobstaxt* to your consideration. A book of this description will be found in many countries abroad to regulate, as that of Denmark does, the maximum emolument achievable for chemical and galenicals innumerable; conditions in this free country are otherwise. A similar "taxt" deals with dispensing prices.

EGYPT.

The globe-trotters who congregate at *Shepheard's Hotel*—so Mr. Stephenson, pharmaceutical chemist in the Opera Square at Cairo, relates—bring with them a varied assortment of prescriptions—and languages—both of them at times equally difficult to understand. Arabic prescriptions rather fascinate the dispenser, but these are seldom handed over the counter.

I need hardly remind you of the existence of the horrible eye disease consequent on the pestilential infection by flies, which even the children do not trouble to drive away. Eye preparations—powders of zinc oxide, etc.—are in considerable

demand. A valuable mixture of simaruba for dysentery is described, also an infallible mosquito expeller. Italian proprietary preparations are prescribed fairly extensively.

France.

In the Middle Ages powdered glass is stated to have been a remedy for disease, but it seems almost incredible that Silicate de Soude should be prescribed at the present day in cachet form; this, according to Mr. Chown, at Roberts', is *un fait accompli*, the unfortunate recipient having to take 10 Cgm. five days a month. Ibogaine is the active principle of a Congo *Tabernanthe*, possessing some interesting properties. Similarly terpine di-iodide is somewhat new; it has been exploited for its bactericidal properties in pneumonia.

Hypodermic injections by means of auto-injectable ampoules are of the utmost importance, as during recent years this method of treatment has been gaining ground. Nitrite of amyl and iodide of ethyl are amongst the list of ampoules (1 C.c. in capacity) ready with metal attachments for injection. A specially good one amongst those that I have examined in the way of auto-injectable tubes is that of Dr. Chaussegros. This device, consisting of syringe, barrel, and ampoule all in one piece, with adjustable rubber ball for the pressure, is bacteriologically perfect.

The requirements of the little French pharmacy are not multitudinous, but such items as Baume Tranquille, Onguent Populeum, Onguent de la mère Thècle, though "Codex" preparations, are unfamiliar to many this side of the Channel, to say nothing of the Tisanes, which have their sphere of utility. Linseed is used in France in the same way as pumpkin seeds in the U.S.A., and syrup of snails is still wanted for its emollient qualities for a sore throat.

Germany.

A dealer in proprietary preparations in Germany issuing annually a booklet of new remedies desisted from so doing in the year 1902, in which year alone he described 1,400 of such; pressure of work since then has prevented him from carrying on the idea, though others have brought the task to a conclusion up to the year 1906, with what exact numerical results it is difficult to define.

The Pessar-suppository is an improvement on the ordinary suppository, more particularly for use in the treatment of hæmorrhoids. A central cone in same consists of fat tissue which swells up and provides the physical action. The external coating of theobroma oil provides the lubrication, as in the ordinary suppository.

GREAT BRITAIN.

Of points of interest are *Combretum sundaicum*, the anti-opium plant of which a liquid extract has been made; copper paint for erysipelas, prepared with a mastic varnish; mercury administration in suppository for treatment of syphilis, scaly form of calomel prepared by reduction of perchloride with lithium sulphite, and *Dichondra brevifolia*, glycerin extract (a New Zealand plant), possessing strong antiseptic power, notably on the Klebs-Loeffler organism.

GREECE.

At Athens Dr. Dambergi, the professor of pharmacy in the National University, undertakes in his "model" pharmacy not only clinical analysis and radiography, but adds also pathological research, post-mortem investigation, and embalming to the ordinary routine work. Several of the Grecian mineral waters are sulphurous; one of these contains the bacterium *Beggiotoa nivea*, in the protoplasm of which sulphur particles are plainly discernible. The labels are characteristic.

CYPRUS.

An extraordinary method of treatment is in vogue in this quarter of the globe,—i.e., for jaundice the natives introduce the juice of the squirting cucumber up the nostrils.

GUERNSEY (CHANNEL ISLANDS).

Pharmacy here is obviously half French and half English. A proprietary preparation designated "Oil of Fives" is said to be of value in rheumatic pains, neuralgia, etc.

INDIA.

From Ceylon several new drugs have been imported: *Asparagus falcatus* (cholagogue, diuretic, and aphrodisiac); *Cyperus*

rotundius (stomachic and carminative) the natives employ in epistaxis, useful in dysentery, bronchitis, etc.; *Plectunthrus zeylanica*, in dyspepsia.

ITALY.

Cough pastilles containing narceine and lichen islandica tincture as anti-vomitive are of interest, as also the fact that seidlitz powders in Italy consist of magnes. sulph., 15, sodium bicarbonate, 2, and tartaric acid, 2. Ferrous arsenate solution in the form of ampoules, etc., is in considerable demand.

Amongst novelties are thiosinamin-sodium salicylate injection, Agua del Gerez, Auricodile, and Extracto Ipofiso. The composition of proprietary preparations is required to be stated. That of Fellows' Syrup and Scott's Emulsion are notable. The prevalent use of sodium hyposulphite internally is also of interest.

NEW ZEALAND.

Prescribed medicines are hopelessly unpopular; the advertized preparation invariably supersedes the medical man's most carefully thought out treatment e.g., according to Dr. Walter, of Wellington, if a mild laxative be ordered for occasional use, in a short time the patient will discard it and be taking "Indian Root Pills" or "Blank's Pills" instead, giving as his "excuse" that it is a "bad thing to get in the habit of taking doctors' medicines." Even sheep-dip is used for vaginal irrigation in place of the medical man's scientifically compound solution.

PORTUGAL.

From a medical man and pharmacists at Lisbon I have been able to collect what may be termed the "national" requirements. The law regulates prices, the publishing of formulæ of proprietary preparations, and the free distribution of valuable remedies to the poor—e.g., serums (anti-tetanic and diphtheritic), cod-liver oil, quassin granules, and opium pills. The Lisbon Pasteur Institute provides hypodermic injections. Then, again, benzonaphthol, calomel, also quinine and phenacetin, are to be supplied "according to law." Medicated wines are very largely used.

RIVIERA.

As to the requirements of the Riviera, the average Southerner is far more enlightened than the layman from Great Britain:

he is well conversant with drugs and the reasons for taking them. He demands his large dose of phenazone or his tincture of iodine as the initial treatment for colds, La Grippe, etc., or his tisane, to the astonishment of the English assistant. The tisane, by the way, probably the only non-alcoholic warm drink ever consumed by the patient, may on occasion be the saving of his life—it washes the poisonous toxins from his system. Apart from other customary uses eau de Cologne is used by the litre for frictions. Kefir is also largely employed. Limonade Purgatif, on the lines of that in the "Codex," should certainly receive attention in this country—it is simple to prepare and refreshing when completed—and then, again, it can only be made by a pharmacist.

RUSSIA.

The dispensing of 2,200 prescriptions *per diem* is no mean undertaking; this is the regular number at the Pharmacy Gesellschaft, W. K. Ferrein, at Moscow. Mr. P. Federoff, one of the assistants in this establishment, tells me that at the time of my originally corresponding with him, no less than 2,562 prescriptions were dispensed on a single day (Februry 5, last). I am showing copies of some of these prescriptions. Epidemic diseases of various kinds were responsible for the increase above the normal quantity *pro die*. The old system of weights and measures, it will be seen, still holds its own—at any rate amongst the older medical men. No new preparations are dispensed without a doctor's prescription until their constituents and action are understood. Herbs are very largely used by the public—the middle-class and the peasants—they prefer quack doctors to *bonâ-fide* medicos, and amongst the quacks are many women herbalists.

"Acidum Aceticum Aromat"—"Vinegar of Four Robbers"—has a quaint and doubtless true origin. Long ago, in a plague, criminals were ordered to bury the dead. All those entrusted with the task became infected and died, with the exception of the four who rubbed themselves with this aromatic vinegar. Balsam Embryoni is used by the peasant women in certain conditions. Elixir Viscerale Hoffmani is another name for Elixir Aurant. Comp. Emulsio Seminum Cannabis does not refer to *Cannabis sativa*. *Fragaria*—both leaves and root are used in various ways. Carbolic acid is freely sold to the public.

Sodium Choleinate is useful to "get meagre the fat clients." Rye coffee is a cheap substitute for the genuine article. Spongia Fluviatilis forms, amongst other uses, the "rouge" of the peasantry. Pyroligneous and lactic acids form vaginal irrigations and the new drugs and interesting and out-of-the-way preparations in Russia are very numerous.

South Africa.

In considering the pharmacy of South Africa one may subdivide it into pharmacy as such (very small indeed), Dutch remedies (considerable), and Kaffir remedies (little known and jealously guarded by those who do know). The remedies for snake-bite are numerous. For disinfecting anthrax-poisoned meat may be mentioned *Cluytia hirsuta.* For dysentery and enteric a treatment with mag. sulph. and chlorodyne, and complete omission of the customary milk diet on the grounds that the dysentery bacillus is believed by the advocate of this treatment to thrive on milk, seemed worthy of recording. *Pelargonium renifolium* is of local importance, and is, I believe, of considerable utility. *Monsonia* is also used. For snake-bite are permanganate lancets and ipecac. root rubbed on the part, *Leonotis* (highly valued), *Teucrium africanum,* and Croft's Tincture.

I have dipped pretty thoroughly into Andrew Smith's *Materia Medica of South Africa,* more particularly as the work is completely out of print and unobtainable, and the information is, on the whole, reliable. Some of the chemistry has naturally, in 1907, to be viewed leniently; the fact remains that Andrew Smith, of St. Cyrus, seems to have been on very friendly relationship with the natives, and was able to learn valuable and usually jealously-guarded information.

The following South African plants are of special interest:—*Acocanthera Thunbergii* (distinctly poisonous and worth investigation); *Cassia mimesoides* in dysentery; *Chenopodium vulvaria* (contains trimethylamine); *Combretum bracteosum,* the "Hiccup Nut"; *Hippobromas alata,* with peculiar odour; *Lasiosiphon Meisneri,* an irritant resembling mezereon to some extent; *Leonotis leonurus,* of high repute amongst the Kaffirs in snake-bite; *Mesembryanthum* (the Kauw-Goed) dilates the pupil and is worthy of further investigation; *Phytolacca stricta* (wild sweet potato) containing saponin (Holmes); *Sanseviera,*

for piles, why or how it acts seems unknown; *Tabernæmontana*, with quinine-like properties; *Teucrium africanum* (Padda Klauw), in snake-bite and for Mil-ziekte-infected meat; *Withani somnifera*, in chest complaints, and the berries used for ringworm; *Xanthoxylon capense*, wild cardamom, pungent, carminative; *Xysmalobium lapathifolium* (with silky hairs to the seeds).

In addition to a number of drug specimens which Mr. C. E. Oliver, of Messrs. Gardner and Co., East London, has sent me—and to whom I am indebted for the loan of "Andrew Smith"—I am showing a species of *Buphane*, which is a local botanical curiosity. When the fruits of this plant are sufficiently ripe the flower head detaches itself bodily from the stalk of the plant and blows over the veldt, chased by the wind, dispelling its seeds for the benefit of its race.

Spain.

Some out-of-the-way, though vouched for, and *bonâ-fide* remedies were sent me by Mr. Roberts, of Gibraltar. The natives have implicit faith in them. For tapeworm is Pipas de Calabaza —*Cucurbita pepo*—pumpkin seeds pounded into an electuary with castor oil and honey, and taken with milk Hojas de Eucalipto, infusion for intermittent fever; Emplastra de Vigo, Emp. Hyd. Ammon. as a "cure" for hernia; Semilla de Belenio, henbane seeds, smoked for toothache.

Switzerland.

My informant, a Swiss pharmacist at Aix-les-Bains, happened to be of Anglophile persuasion, preferring, *inter alia*, the British method of measuring liquids to weighing same. The Concentrated Infusions, 1 to 7, appeal to him, and the English syrups and tinctures, he says, represent the drugs from which they are prepared. He states that dispensing bottles divided into tablespoons, etc., are unobtainable on the Continent; they have to be imported from England.

Turkey.

There seems to be a certain amount of licence in the matter of dispensing foreign prescriptions at the Turkish ports; they have indeed all to be brought down to the common level of the French Codex should difficulties arise—this is recognized as the semi-official pharmacopœia. From all accounts the pharmacist is

not exceedingly popular; indeed, he might be classed as down-trodden. The law prevents him from importing or employing such valuable medicines as cocaine, cacodylates, nitro-glycerin, arrhenal, picrotoxin and Cannabis Indica.

An amusing account is forthcoming from Pera, which may perhaps be considered the Mayfair of Constantinople. The medical man treats all the patient's symptoms at once, producing the most astounding incompatibles quite incapable of toleration by the human organism. The information from the opium-growing district of Salonica is no less remarkable from the pharmaceutical standpoint Conditions of sale being distinctly lax, deadly poisons, such as sublimate, are to be found mingled with- or, at any rate, alongside of—grocery and general provision stock. The weighing or measuring of medicine in the little stores is even dispensed with—with the "customary" dire result. Contract practice by the "physicians" has resulted in an all-round fee of 40*s.* per annum, this figure securing a visit every day. Details of too deep a description would, according to my correspondent, not be advisable to seek, except with the accompaniment of a dagger or revolver; the interior is dangerous.

UNITED STATES.

My correspondent happens to be a man who served his apprenticeship under the physician-pharmacist discoverer of ether anæsthesia—Dr Crawford Long, whose ultimate desire, he said, was to be a "benefactor of his race." Mr. Jacobs, of Atlanta, Georgia, has seen U.S.A. pharmacy through many changes for good and evil since the seventies, commencing with the days of drug collection in the fields, passing to "elegant" pharmacy and (charlatanry) in the eighties, thence to the times (1890 to the present day) of the highly-valued detail-man and similar pushful institutions.

Of 100 prescriptions selected at random in an Atlanta store, 72 were proprietary, the remaining 28 were pharmacopœial, or viewed in another way, 55 were liquid, 1 bolus, 34 capsules, and pills, and 10 powders. Of these six were polypharmacal, and two incompatible.

Then, again, another genial American pharmacist, Mr. Wilbert, the secretary of the Philadelphia branch of the American Pharmaceutical Association, sends me some interesting notes. He says, amongst other things, that by far the larger number of

drug stores partake somewhat of the nature of a bazaar. He also relates that the American Medical Association is making strenuous efforts to combat the sale of proprietary articles, and is meeting with success.

There is no small amount of pessimism in Mr. Jacob's long life story, but at the end will be found a friendly co-operative element between the physician and the pharmacist.

Dr. MARTINDALE distributed handsomely produced booklets containing the full paper, which were much appreciated. He had also a collection of specimens of the characteristic preparations of the different countries. These were neatly mounted on boards and plainly labelled, the whole being contained in a divided cabinet. The specimens were handed round during the reading of the paper.

The PRESIDENT, in a few happy remarks, thanked the author for "his infinite capacity for taking pains."

Dr. MARTINDALE replied that his reward lay in the knowledge that he had learnt through getting the paper together.

THE PRESERVATION OF CERTAIN LABORATORY SOLUTIONS.

BY F. H. ALCOCK, F.I.C., F.C.S.

The subject of the preservation of laboratory testing solutions is full of interest and difficulty, as is seen when reference is made to the textbooks on this particular part of the chemist's work or even to the B.P. Appendix itself. How frequently the words "to be freshly prepared" occur. This is notable in the case of solution of albumin and solution of starch. With regard to the former, I am not aware that many attempts have been made to to preserve this reagent, one recorded in *The Pharmaceutical Journal* [3], 21, 939, by Mr. R. A. Cripps, should be recalled, which consisted in the addition of 10 per cent. of B.P. acetic acid, when the author of the brief note stated that it kept several months, and some had remained good for six months. This in my hands has not proved a success for any reasonable time of keeping, but that that is so may be accounted for by the indefiniteness of the instructions. Those who are acquainted with tannin determinations are familiar with the fact that gelatin solutions, which in some ways, and for some purposes, resemble

solution of albumin, have been recommended to be preserved by means of mercuric iodide, and these are the only two I can find in the books or remember. With regard to the second preparation, although its use is fairly constant in a busy laboratory, yet there are extensions of time when its use would not be called for. The many suggestions which have been made for the preservation of this solution are all good in their way, but none seems to be free from objection, for in some operations the presence of the common preservatives may, and do, prove objectionable in one way or another. Now, with both these solutions, I have met with successful keeping by means of benzin, and it can be recommended with confidence for the preservation of both these test solutions. I have previously made a passing notice of this in a paper read before the Wolverhampton Association of Chemists, November 8, 1905, but had not then given it an extended trial, and, moreover, the kind of benzin was not mentioned. As I have been asked many times the kind of benzin, I may now say that I have used a cheap variety known as mineral naphtha, which costs me about 2*s.* per gallon. Its specific gravity at 60°F. is 0·8706, and 25 C.c. of it left a residue of 15 Mgm., and its initial boiling point is 140°F., rising gradually to 298° to 300°F. when the greatest portion passes over, although in the final stages the temperature rises as high as 326°F. The quantity I have used for the albumin solution, as prepared by the B.P. plan, is 1 to 2 C.c., but more or less makes very little difference as far as the use it is put to in my laboratory is concerned, and, for the latter, for 100 c.c. of product 1 C.c., is usually quite enough. It should be stated that the albumin solution is aspirated through a column of cotton "wool" or tow to remove the insoluble portion. The mode of action of the preservative is probably the production of an atmosphere in the containing vessel, which, on the one hand, is inimical to, or destroys bacterial germs, and on the other hand, precludes the oxidizing action of the air.

DETERMINATION OF THE AMOUNT OF ALKALIES IN THE ASH OF DRUGS.

By F. H. Alcock, F.I.C., F.C.S.

The determination of the ash of drugs has reached an important stage in the present day, but whether it is reliable evidence of the goodness or otherwise of them is, as yet, undecided. The

nature of this ash has not received a large amount of attention from workers except in a few occasional instances, notably that of the ash of ipecacuanha by H. E. Munns, that of buchu by H. W. Jones, and cinchona by D. Hooper, all of which have been published in back numbers of the pharmacy periodicals, and from my experience of the determination of the amount of alkalies in the ash of drugs this operation seems to be one not easily performed where a high degree of accuracy is required. My attention was directed to the matter by a very innocent query submitted by a brother pharmacist. It was, "Does this Pilula Rhei Composita contain the right amount of soap?" The problem was attacked rightly or wrongly from the alkaline constituents point of view, and two samples of the galenical named above were prepared, one containing all the ingredients as directed in the B.P., and an exactly similar one prepared with the same materials, but using Saccharum Lactis in the place of the hard soap, the required quantity of this ingredient being sent to me also for examination—this for the obvious reason that soap is a very variable commodity in these days of scientific enlightenment. It will not serve any good purpose to go through in detail all my troubles in this investigation. The textbooks were consulted and all the general methods tried, which included the elimination of all bases as far as magnesium, after first converting them into chlorides by the usual method with barium chloride, and subsequently making the attempt to remove this and the traces of calcium by means of the ammonium carbonate and oxalate precipitation method. The lime persists in making itself evident at the time and place when only the alkalies potassium and sodium are expected. This by reason of some sort of reversible action, a phase with which all are familiar who have samples of cream of tartar to examine. At any rate, in my hands the results were far from satisfactory, and a fresh start had to be made. Again referring to the textbooks, and this time that of Fresenius an old edition, the only one available—mention was made of a lead method which was recommended as accurate but tedious.

It may now be said that the admirable notes on chemicals by Mr. Edmund White, B.Sc., which are now appearing in *The Pharmaceutical Journal*, recalled much of my past work in this matter and suggested this note—and this process was tried in what was believed to be a true interpretation of the method set forth, and the result was freedom from lime and other base

except, of course, those of potassium and sodium, the lead being removed by sulphuretted hydrogen. And when the ignition stage for the expulsion of all the ammonium salts was completed, a large residue remained which could not, from the amount of substance started with, be all alkali. It was in fact mainly metaphosphoric acid. Evidently the process was not a success, or the mode of procedure was not correctly followed, or some omission had been made, or some modification was essential, or an error had occurred in the act of translating from the German, or some other cause. To be very brief, and in conclusion, it was found that the process can be well recommended if at the stage when the lead salt has to be used the proper quantity of Liquor Plumbi Subacetatis of the British Pharmacopœia is substituted. The results come out well, and can be repeated with accuracy to the second place of decimals. The note *ex* Fresenius will therefore read as follows :—After removal of all bases as far as magnesium in the usual analytical method, an extended time is necessary for the complete removal of this—at least twenty-four hours; the free ammonia is then expelled by evaporation and Liquor Plumbi Subacetatis added in slight excess; then filtration and washing of the precipitate and subsequent removal of surplus lead solution from the filtrate by means of hydrogen sulphide; then evaporation to dryness in the presence of nitric acid, which plays a two-fold part of oxidation of the free sulphur and oxidation of the ammonium salts, and final treatment of the residue with either hydrochloric acid or dilute sulphuric acid, or both, and gentle ignition to complete oxidation of the carbon, and final weighing as sulphates. It should be noted that operators who have a respect for their platinum dishes are advised not to use these in any part of the process, for even when Pilula Rhei Composita is incinerated in a platinum dish it does not tend to improve this costly piece of apparatus.

Mr. S. F. Burford thought that this paper was the beginning of a series of investigations into the preservation of laboratory solutions, in which direction much remained to be done. He had himself preserved volumetric solutions of sodium thiosulphate unchanged for six years by the addition of 0·1 gramme of salicylic acid per litre.

The President supplemented these remarks by observing that in laboratories where such solutions were occasionally used it

was absolutely necessary that their good quality should be maintained, and even where much work was done some solutions were always requiring attention. Therefore, anything which contributed to our knowledge of the means of the preservation of such solutions was useful.

ON CUCUMIS TRIGONUS (ROXB.) AND COLOCYNTHIN.

By W. A. H. Naylor, F.I.C., and E. J. Chappel.

Some time ago Mr. Holmes handed to us a few dried fruits of *Cucumis trigonus*, Roxb., for investigation. Dymock describes the fruits in his *Materia Medica of Western India* thus :—"*Cucumis trigonus*, Roxb. (*C. pseudo-colocynthis*, Royle) is very common in the Bombay Presidency, but I have never known it used medicinally. The fruit is of the size and shape of a small egg, and marked with green and yellow streaks like colocynth. It is very bitter, but is sometimes eaten by the natives after having been soaked in salt and water. Vernacular, Karél."

Before commencing our search for colocynthin the seeds were carefully separated and rejected, the yield being 96 Gm. from 136 Gm. of the fruit. The balance of 40 Gm. of rind and pulp was ground in a coffee mill and treated by Henke's method (*Archiv. der Pharm.*, ccxxi., 200–205) for the extraction of colocynthin. To remove extraneous colouring matter and to obtain the product in a sufficiently pure condition for identification, the mixture of the tannin compound and lead carbonate while in the moist condition was treated with animal charcoal and then dried. A yellow amorphous body weighing about three centigrammes was finally obtained. As the quantity of product at our disposal was exceedingly small, and for the purpose of identification would admit only of the applications of colour tests, it became necessary to isolate in a state of undoubted purity colocynthin from the pulp of *Citrullus Colocynthis*. Henke's process in its main outlines was followed, and yielded a colocynthin which gave in a satisfactory manner the characteristic tests. On applying the following colour tests side by side and simultaneously to this standard specimen and to the body isolated by us from the pseudo-colocynth, no marked variation was noticeable, showing that the two were either identical, or closely related bodies. With sulphuric acid an orange colour changing to red; with sulphuric acid containing a little ammonium vanadate, a blood-red-colour, which on standing assumed a purple

shade and became blue at the edges; with Froehde's reagent a cherry-red colour, and with phenol and sulphuric acid a blood-red colour changing to orange. It may be remarked, in regard to yield, that the 40 Gm. operated on included all portions of the fruit except seeds, and that, if it had been practicable to separate the pulp, the yield of colocynthin from it would probably have been larger.

The possession of a small quantity of an authentic specimen of colocynthin provided us with the opportunity of investigating one or two points in dispute, notably the chief products of hydrolysis. Walz, who subjected the fruits to an extended examination, appears to have been the first to isolate a body which had a claim to represent the active principle of a degree of purity until that time unattained. He described it as occurring in yellowish-white crystalline tufts, and as yielding on hydrolysis a new body colocynthein and glucose He also isolated a white crystalline principle colocynthetin, soluble in ether and alcohol, but insoluble in water. Henke failed to obtain colocynthin in crystalline form either by his own process or by that of Walz, and considered the statements regarding its decomposition by acids into colocynthein and a sugar very improbable. Johannson (*Year Book*, 1885, p. 119) stated that colocynthin on hydrolysis gave colocynthein, elaterin, and bryonin. Wagner (*Amer. Journ Pharm.*, 1893, 179) slightly modified Henke's method for the extraction of colocynthin, and records his failure to obtain it in crystals.

In the subjoined experiments the colocynthin used was in part that prepared by us by Henke's process, as previously referred to, and in part that obtained by a modification of the process, which consisted in precipitating the aqueous solution prior to the addition of tannic acid successively with lead acetate and subacetate, and removal of the excess of lead salt by sulphuretted hydrogen. The product, after washing with ether, was redissolved in absolute alcohol, from which it was obtained by slow evaporation at a low temperature. That portion of the product from Henke's process was amorphous, while that resulting from the modified process just described was most largely deposited on spontaneous evaporation of its solvent in pale yellow needles. These crystals afforded the characteristic colour reaction with sulphuric acid and ammonium vanadate. The samples of colocynthin obtained were hydrolysed separately, but, as similar results were obtained in both cases, the description

of the examination of one sample only will suffice. The substance was heated for six hours with dilute sulphuric acid (1 C.c. H_2SO_4 and 99 C.c. water) in a vessel connected with a reflux condenser, when it partly fused, and became transformed into a brown resin. From the solution, after standing all night, a small quantity of a yellow amorphous body separated. After filtration the solution was agitated with benzene. The latter was separated and set aside for spontaneous evaporation, the aqueous solution neutralized with barium carbonate, and again filtered. The filtrate was concentrated to a small bulk and when cool filtered. The filtrate on heating with phenyl-hydrazine hydrochloride and sodium acetate gave an orange-yellow precipitate, which was collected and washed with cold water. The resin was separated from the accompanying yellow body and washed with ether, which extracted a yellowish white substance, the nature of which we did not ascertain, and some elaterin. The remaining portion of the resin was then exhausted with chloroform and the solution evaporated. The residue was digested with absolute alcohol and animal charcoal, the solution filtered, concentrated to a small bulk, and then allowed spontaneously to evaporate. A white amorphous substance was obtained mixed with a yellow body. The white substance gave the reactions of elaterin in a marked manner, but was still impure. Further purification was attempted by washing with ether, the residue being dissolved in chloroform and the elaterin recovered by spontaneous evaporation of the solvent. A pale yellow amorphous residue was obtained, which gave a yellow colour, gradually changing to red with sulphuric acid, and a blue colour, changing through green to brown with ammonium vanadate and sulphuric acid. When a mixture of the substance with melted phenol was treated with sulphuric acid a crimson colour, which quickly changed to scarlet, was produced. These reactions were compared with those given by pure elaterin, and showed the identity of the two substances. The method of purification adopted involved considerable loss. The yellow substance accompanying the resin was too small in amount to admit of a detailed investigation. From the benzene solution an amorphous yellow residue was obtained. It agreed in its general properties with the description of colocynthein, but contained a trace of elaterin which somewhat obscured the colour reactions. The osazone was crystallized from 45 per cent. alcohol, from which it separated in small orange-yellow needles. When dried at 100°C. it fused and decomposed at

203–204°C., which clearly indicates that the sugar formed is glucose.

A compound probably identical with the colocynthetin of Walz was extracted in the following manner. The portion insoluble in water of the hydro-alcoholic extract obtained in the preparation of colocynthin was macerated with ether, and the ethereal solution digested with animal charcoal. The ether was distilled off, the residue dissolved in absolute alcohol, and the solution set aside for spontaneous evaporation, when a sticky brown mass was obtained. This yielded to petroleum ether a white crystalline body mixed with some oily matter. The petroleum ether extract was spread on a porous tile to remove the oily impurities, and then dissolved in ether, the solution filtered and allowed to evaporate and the product finally crystallized by spontaneous evaporation from petroleum ether. A white crystalline body soluble in ether, petroleum ether and alcohol was thus obtained. During the course of our work a sample of colocynthin was purchased from a firm of reliable manufacturers. Although it was labelled "Puriss.," we found it to differ markedly from the specimens prepared by us. It was an orange-brown powder, and it formed with cold water a slightly turbid solution deeper in tint than solutions of the pure substance, which cleared on warming, with separation of a dark resinous precipitate forming about 0·8 per cent. of the colocynthin taken. When treated with sulphuric acid and ammonium vanadate the colocynthin gave a dirty brownish colour. A small quantity of the sample was dissolved in cold water and the solution filtered. To the cooled filtrate tannic acid solution was added and the precipitate produced treated with lead carbonate, etc., in the usual manner. We thus obtained, but with considerable loss, a product of a bright yellow colour, which still failed to give in a satisfactory manner the reaction with sulphuric acid and ammonium vanadate. It was evident, however, that considerable purification had been effected by the precipitation.

These experiments, as far as they go, help to establish the following facts. That pseudo-colocynth contains a principle identical with or closely related to colocynthin. That colocynthin prepared from *Citrullus Colocynthis* may be obtained in a crystalline state, despite the failures of Henke and Wagner to induce it to assume a crystalline form. That notwithstanding the doubts cast by Henke upon its decomposition by acids into colocynthein and a sugar, our results on the contrary confirm

those of Johannson that colocynthin is capable of hydrolysis, and that it yields amongst other products colocynthein and elaterin, to which we may add—and a sugar, glucose. That colocynth contains a white crystalline body agreeing in its general characters with the colocynthetin of Walz. That the "Colocynthin Puriss." examined contains a considerable proportion of impurity.

Mr. H. FINNEMORE spoke of Mr. Naylor's contribution as marking a great step in advance. Although the colour reaction was given, no reference was made to the melting point of colocynthin, which would be an important guide to the purity of the glucoside obtained.

Mr. H. GARNETT asked if Mr. Naylor had been able to assign a definite formula to the substance, or could give an equation showing the course of the hydrolysis.

Mr. NAYLOR replied that he did not say that everything had been settled with regard to this subject, and, indeed, so far, but little had been done in connexion with the constitution of colocynthin. But what he did say was that so far as their results went the experiments they had made went to establish certain facts. The first thing they set out to find was whether colocynthin could be obtained in a crystalline form, and the results showed that it could be. As to the formula of colocynthin, while he had very grave doubts whether it was actually known, a formula had been assigned to it.

ARTIFICIAL CALAMINES AND THEIR USE IN DERMATOLOGICAL PRACTICE.

By PROFESSOR R. B. WILD.

This is a subject that has interested me for many years, my attention having been first drawn to it by the necessities of practice. The question of the colouring of lotions, powders, and ointments is of considerable importance. Many affections of the skin do not interfere with the general health in any way, and patients find themselves anxious to go about their ordinary business. They are naturally anxious that lotions and ointments they are called upon to use should be rendered as invisible as possible. The fact that these remedies can be rendered almost invisible enables the patient to apply the treatment continuously, instead of only putting them on when they cannot be seen by other people. Calamine was formerly used as the chief ingredient in these lotions, ointments, and powders, and it was

used for two reasons. The first was because of its curative properties, and the second because its colour reasonably approached to the colour of the skin. But calamine was removed from the Pharmacopœia in 1898, and since then what had been dispensed as calamine seems to have been of very variable quality indeed. I have found very great difficulty, both at the Skin Hospital and in private practice, in getting lotions and ointments coloured suitably in a harmless way. Some things dispensed as calamines are of a very extraordinary nature, and some of them have produced severe inflammation of the skin in the patients to whom they were applied, and were even sometimes found to contain quite a considerable quantity of arsenic. I suppose it got in with the colouring matter, but it was responsible for a great deal of trouble. Other difficulties which arose induced me to investigate the question of colouring matters in lotions, ointments, and powders with a view of trying to get something approximating to the colour of the skin without causing any harm, and which should, if possible, have the curative properties found in the old calamine. The first thing to do was to try and find the colour of the normal skin. Skin colour is very difficult to define, because of its peculiar satiny lustre in a reflected light. Indeed, I found great difficulty in trying to estimate the exact tint of the skin. I found the best way to do it was to make powders of artificial calamines of various kinds, to alter the colour until I got the colour of the skin itself, and then, by the use of Lovibond's tintometer estimate the colour value of that particular powder. I have a little diagram which practically represents fairly well the colour factors in the normal skin. Having examined all kinds of colouring matters, including various iron oxides, I found jewellers' rouge and Armenian bole to be the most suitable for the purpose. An analysis of the colours showed that these two substances, when diluted, came very near indeed to the colour of the normal skin, and the calamines were very easily made from them. By diluting them down we got a colour which has no shade at all, but simply a very pale kind of pink. This can be produced by the addition of 1 per cent. of jewellers' rouge, or 1¼ per cent. of Armenian bole to zinc oxide or zinc carbonate. The next question was to find the best base on which these colouring matters combined. Zinc oxide did not go at all well, and the best lotion I could get hold of was made from precipitated zinc carbonate with 2½ per cent. of Armenian bole. I think it is desirable, now that

the British Pharmacopœia does not define what calamine is at all, that some authoritative formula should be found for a factitious calamine. I would suggest that the Conference should devise a formula for artificial calamine which could be described so that we may know what we are getting.

Mr. R. WRIGHT expressed his high appreciation of the paper, which, he said, exemplified the value of the application of scientific methods to the smallest details of pharmaceutical practice. He himself had made experiments in the same direction as Professor Wild, starting with the assumption that the normal skin colour was a brown or mixture of brown tints. Working on this basis he had reached practically the same conclusions as Professor Wild had done. It was well known that native calamine was quite unobtainable, and the point to be settled was what should be the character of an artificial substitute. He should like to ask Dr. Wild, as an authority in therapeutics, what was the nature of the action of calamine upon the skin? Was it a purely mechanical effect, or was it due more or less to a specific action of the preparation on the epidermis, the nerve terminals, or pores of the skin? With regard to the preparation of an artificial calamine, there was a difficulty in preparing a perfectly amorphous and impalpable powder by triturating a mixture of powders, and a method of preparation by precipitating a mixed solution of zinc and ferric sulphates would give, he thought, a preferable powder. He felt bound to express his thanks to Dr. Wild for the paper, because as pharmacists they knew that no lady would use an ointment during the day unless its colour was some approach to the normal colour of the skin.

Mr. RUTHERFORD HILL said this was an interesting practical contribution. There could be no doubt as to the necessity for an authoritative formula for a definite artificial calamine. Calamine was extensively prescribed, and much of that actually in use consisted chiefly of barium sulphate, which was an undesirable substance in dermatological applications. In 1903 Mr. William Lyon read a paper at a meeting of the Pharmaceutical Society in Edinburgh, giving a formula in which calamine was formed by precipitating a solution of zinc sulphate containing a definite percentage of ferric sulphate, by adding sodium carbonate. The precipitate was dried and heated so as to yield zinc oxide, with ferric oxide so minutely diffused that no specks were visible even

under the microscope. The tint could be varied by adjusting the percentage of ferric sulphate. It was a distinct gain to the Conference to have a distinguished pharmacologist presenting a matter like this from his point of view.

Mr. HORACE FINNEMORE said it was exceedingly refreshing to find a medical man like Professor Wild taking an interest in pharmaceutical subjects, and it must be stimulating to the pharmacists of Manchester to have Professor Wild in their midst. The question of calamine colouring had frequently been brought before his notice in hospital experience, because he found that the calamines were mixtures. The impression he had gathered from the medical profession was that what was required was an insoluble powder, and that, therefore, sulphate of barium might be as useful as an insoluble zinc salt. Did Professor Wild know of any experiments in support of this ?

Mr. J. C. UMNEY said that wholesale druggists had great difficulty at times in matching calamines required for various purposes. Hitherto the methods had been rule of thumb ones, but the tintometer appeared to offer a more accurate and easier means. He stated that wholesale druggists distinguished on their lists between factitious calamines made with zinc oxide and carbonate, and Armenian bole and so-called native calamines, which were almost entirely sulphate of barium suitably coloured.

Mr. T. MALTBY CLAGUE remarked that he wished to associate himself with the previous speakers in his appreciation of the scientific application of the tintometer to a practical case like this. There was, however, no possibility of one calamine meeting all cases. What was skin colour here was not skin colour elsewhere, and one was often required to cover over a skin of an abnormal colour, such as ecchymosis of the orbital region, produced by an unmailed fist, which was so blue or purple as to defy the pinkest of carmines. At least three tints would be required, and these might be on Dr. Wild's colour lines, and the co-operation of the patient can always be secured in so personal an application.

Dr. CHARLES SYMES thought the Conference was very much indebted to the author for his interesting and practical paper. The 1885 B.P. gave tests for calamine which the substance described complied with. It was a substance not usually prescribed alone in lotions, consequently if a standard was taken for calamine it should be of a rather darker tint than commonly required, because calamine lotion usually contains

part calamine and part oxide of zinc, and the prescriber could alter his proportions to meet his requirements.

Mr. EDMUND WHITE pointed out that the great difficulty experienced by the dispensing chemist and by wholesale druggists was to get a calamine to suit everybody—in fact that could not be obtained, because no one calamine could possibly meet every case. If Dr. Wild continued his investigation it would be a great advantage. He believed one could not buy real calamine; it was exceedingly difficult to get hold of anything which corresponded to the old calamine. He asked whether zinc as oxide or carbonate was the essential feature in the preparation. Mr. Hill had referred to Mr. Lyon's suggestion of a synthetic calamine. He had tried that formula, and found it was a nice preparation when finished, but it was never twice alike. A standard was very desirable, for boles were never twice alike, and they were too pink. He mentioned that fuchsine was a bad addition as a colouring agent.

The PRESIDENT said he had made calamine of several different colours, and when he once suggested uniformity he was practically told to mind his own business. He referred to the difficulty of tinting precipitated barium sulphate; it was so exceedingly fine that it would not take some of the colouring mixtures. Coming to a matter which the speaker described as "extremely delicate," he ventured to refer Dr. Wild to the *Year-Book* of a few years ago, where there was a formula for calamine in the B.P.C. Formulary which had not been adopted. What he wished to say was that he did not agree— and he still held to that opinion—to doing away with the Formulary. He was not aware at the time that that was contemplated. However, he had great belief in the wisdom of humanity as a whole, and therefore he supposed it was for the best that the Formulary did not now exist. But he felt sure the spirit which created the Formulary still existed.

Professor WILD, replying on the discussion, thanked the speakers for the kind remarks they had made about the little work he had been able to place before them. He was very gratified at the interest displayed in the subject, because to the medical man it was a most important one. He had tried as far as possible to avoid fixing any definite standard for skin colour, but had adopted two limits, within which were included the great majority of skin colours in this country. With regard to the question of barium salts, they were distinctly more irritating than zinc salts. He had found barium sulphate calamine to be

irritating in some cases, whilst in others there was no irritation. Of course, when the skin was inflamed it was much more irritable than the normal skin. The zinc and bismuth preparations acted, he thought, as something more than mere protective dusting powders, as decomposition with the acid secretions of the skin took place when they were applied, and they are thus of value as astringents as well as protectives. As to the making of calamine, he felt that that was a matter which must be left to pharmacists themselves. All he wanted to do was to show the necessity for something of the kind he had indicated. How this was to be worked out, and what was the best formula, he thought should be left to pharmacists to settle. All that, as a medical man, he had to do in the matter was to point out what was wanted. He was sure it could be left to the British Pharmaceutical Conference to produce a better formula than he could suggest from his point of view.

IMMUNITY TO DISEASE AMONG PLANTS.

BY F. E. WEISS,

Professor of Botany in the University of Manchester.

The question of immunity to disease has been so closely studied and so frequently discussed in connexion with the diseases of man that it seemed to me that it might be of interest to members of the Pharmaceutical Conference if I brought to their notice some of the facts now known to us about the incidence of disease among plants, and the theories which have been advanced as to the cause of the immunity which some species and varieties exhibit to various diseases.

Roughly speaking, we may distinguish between climatic and infectious diseases of plants, the former being produced by unfavourable conditions of temperature, of rainfall, and of physical and chemical nature of the soil; the latter are produced mainly by vegetable and animal parasites. As regards the former, it is a well-known fact that different races and varieties of plants show greater power of resistance to cold, particularly to frost, to drought, or to the presence or absence of certain chemical constituents of the soil, than do others. It has also been noticed that the effects of frost are different according to the constitution of the individual plant at the time of the occurrence of the untoward condition. When young and full of sap, the leaves and shoots are more liable to destruction than when mature and hardened. It has been

shown recently by Couturier that special methods of culture, particularly the manuring of plants with potassium salts, gives them greater power of resisting the injuries of frost than when not so treated. The explanation of this phenomenon must probably be sought in the better development and earlier maturation of plants when treated with the potassium salts.

Particular varieties of fruit trees, therefore, which produce their flowers and foliage somewhat later or mature their branches earlier than the rest, will be less liable to injury from spring and autumn frosts respectively than are the ordinary kinds, and are more suited to rigorous climates. It is by the selection of such hardy forms that frost-resisting varieties have been established, which have enriched some countries in which the winters are unusually severe. Much good work has been done in the excellently managed experimental farms in Canada by Dr. William Saunders, in obtaining forms of fruit trees and other useful plants suited for the most northern latitudes of the American continent. The most resistant of all forms of apples he has produced by crossing hardy varieties with the Siberian crab-apple, a wild form native of northern climes. Suitable selection and clever hybridizing must always remain the foremost method of producing new varieties of cultivated plants which are to be immune against the extremes of temperature or of water supply.

By far the greater number of plant diseases are caused by fungal or animal parasites, often occurring in such vast numbers as to become veritable pests. Even the smallest acquaintance with these often epidemic diseases reveals the fact that many varieties of plants are more or less immune, and even in varieties which are severely attacked some individuals escape altogether. In such cases we have two facts to consider—first, the selective power of the fungus, and, secondly, the resistant power of the host plant.

It is well known that many fungi are exceedingly particular as to the plants which they attack, while others are more omnivorous, if I may use this term. The rust (Gymnosporangium) which is found on pear and apple trees, confines its attention to the group of Pomeæ, and is apparently unable to grow on other members of the Rosaceæ, while the second stage in its life history is found on the Cupressineæ, but not on other conifers. Similarly the rust of wheat passes one stage of its existence only on the bearberry. The late Professor Marshall Ward

has further shown that *Puccinia dispersa*, the brown rust of grasses, seems to exist in several "biologic forms," each of which attacks only one group of nearly related species of *Bromus*, and the same condition obtains in the Erisipheæ, or mildews, according to Salmon. How is it that these fungi are incapable of infecting such nearly related host plants as are represented by the species within a single genus? The suggestion was originally made that differences in the thickness of the cell walls, fewer or smaller stomata, longer hairs, etc., were the obstacles which repelled the fungi and rendered certain species and genera of plants immune to the attacks of particular fungi. Working with the different species of *Bromus*, Marshall Ward was, however, able to show that there was no relationship between the stomata, hairs, and so forth and the infectibility of the species. Immunity did not in any way depend upon the anatomical characters of the host plant, but entirely on physiological reactions of the protoplasm of the fungus and of the cells of the host. In other words, infection and resistance to infection depend on the power of the fungus protoplasm to overcome the resistance of the cells of the host by means of enzymes or toxins; and reciprocally on the protoplasm of the cells of the host to form anti-bodies which destroy such enzymes or toxins, just as is the case with resistance of animal organisms to their bacterial foes. Salmon has shown in his experiments that susceptibility in a leaf normally immune to the attacks of the biologic form of a particular mildew may be induced by various mechanical means, such as cutting the leaf or searing it with a red-hot point of a knife, or by exposing the leaf to ether or alcohol vapours, or by exposing it to heat. The resistant vitality is thereby impaired, and the fungus gains the upper hand. The corresponding phenomenon is well known in the animal organism. According to Metschirikoff, pathogenic micro-organisms, such as those of diphtheria and cholera, may be present in the human body, without producing the disease unless by some means the resistant power of the individual becomes impaired. In cases where natural immunity does not exist or is doubtful, it has become customary in the case of man to prevent disease by injection of suitable antitoxins, or as a temporary measure by taking of drugs, such as quinine, etc. Plants, too, if not immune to a particular disease, may be rendered so to a certain extent by similar methods. More or less successful injection experiments have

been made in the case of fruit trees suffering from chlorosis, and as a result animal parasites have been got rid of as well. Undoubtedly the general vitality of the tree can be raised by such means, etc., and thus the disease is thrown off. That increased vitality can check disease is a well-known fact. Hemmings has given numerous examples of this, a particularly striking instance being a *Rhododendron ferrugineum* in the Botanic Gardens of Berlin, which was badly infected with *Exobasidium rhododendri*, but subsequently entirely recovered.

Similarly it has been asserted that diseases may be prevented—in other words, plants rendered immune—by good or impaired nutrition.

Marchal has stated in the *Comptes rendus*, **135**, 1902, that young plants of the lettuce could be rendered immune against *Bremia latucæ* by feeding the plants with a solution of copper sulphate (1 in 30,000). This view has received support from Laurent and Massée, but Salmon, on the other hand, has not been able to confirm these results. It will be seen that the views are still somewhat conflicting, and too much expectation must not be placed upon this method of treatment. It may amount to nothing more than slightly raising the resistant power of crops.

The hope of the agriculturist lies in another direction. Plants, like animals, are subject, as Darwin has shown, to a considerable amount of variation, and all characters, whether anatomical or physiological, are subject to change or mutation. Immunity to disease, dependent as it is on certain physiological peculiarities, the secretion of anti-toxins, rather than on anatomical structure, forms one of the factors in this variation. We see this readily illustrated when passing through a field exposed to some epidemic disease, where here and there plants are found which have been either only slightly damaged or not attacked at all. These should be selected for breeding purposes, and thus hardier varieties can be produced. Another method which has shown itself useful for producing resistant forms is by hybridizing. It is a well-known fact that hybrids, while partaking of the nature of one or both of the parents in most characters, generally exceed both in vegetative vigour—a characteristic to which the sterility of some hybrids is attributed. But vegetative vigour, as we have seen above, is generally associated with immunity to disease, and hence hybrids are often found to be more resistant. This is not always the case,

for in this respect hybrids vary too, but the French horticulturists MM. Bouttes and Guillon have been successful in producing hybrid vines which are more resistant to the mildew than either of the parents.

In the selection of immune varieties one is faced with the unfortunate fact that many of the most resistant forms are the least valuable, producing poorer fruits and seeds than the delicate forms. But by judicious hybridizing this defect of the immune race can be largely counteracted. Mr. Lewton Brain has collected a good deal of information on this point. *Vitis riparia* and *Vitis rupestris*, two forms of vine which are quite resistant to phylloxera, yield poor vines, but by crossing them with *Vitis vinifera*, Milardet has produced hybrids which resist both phylloxera and mildew.

Similarly, Ericksson, in Sweden, Carlton, in the United States, and Messrs. Garton, of Newton-le-Willows, have been successful in producing rust-resisting varieties of wheat.

In connexion with cotton crops it is remarkable how great is the range of variation with regard to the resistance of the plants to the wilt disease (*Neocosmospora vasinfecta*). By selection and suitable hybridizing, Rivers has been able to obtain varieties which remained untouched by the disease, while of the neighbouring crops 95 per cent. were destroyed. In the West Indies the Bourbon cane has been given up on account of disease, and other forms have had to be introduced from the Dutch East Indies. Very useful and disease-resisting hybrids have also been produced by crossing the valuable but easily attacked Tjeribon cane with the resistant Indian Tschan cane.

It will thus be seen that though artificial cultivation of plants often induces considerable danger of disease both by close planting and by the fact that plants with well-developed fruits have often a weak constitution, yet breeders have the power by careful selection of their parents to combine disease-resisting powers with relatively great fertility, and therein lies our hope for the future success both of agriculture and of commerce, for agriculture and commercial prosperity are inseparably bound up together.

The question of immunity to disease among plants, though it might at first sight seem to possess mainly a theoretical interest, is of vast practical importance to a community like ours, dependent for its existence upon an abundant and steady supply of cotton and of grain.

Mr. RUTHERFORD HILL said this extremely interesting communication had an important practical aspect for pharmacists. Perhaps he was saying something which was contrary to the commercial interests of some members, but they were public-spirited citizens. He was recently in a part of the country where he found a powerful arsenic solution being distributed on a public road by a machine like a watering-cart. This pointed to the widely prevalent practice of using large quantities of powerful poisonous insecticides for the destruction of disease fungi in plants. He thought the loose way in which this was done constituted a serious public danger. Professor Weiss had indicated another way by which crop-yielding plants could be grown in crowded areas without suffering from those diseases which were so apt to attack them, and spread rapidly. This most suggestive communication indicated that this could best be accomplished by the more excellent way of discovering and applying those cultural conditions which gave a race of plants immune to attacks of fungoid disease.

The PRESIDENT said that he did not think that question was one of public policy. A bundle of pamphlets and papers he had received from the Board of Agriculture confirmed what Professor Weiss had said, and pharmacists, when they were in difficulty as to plant diseases, should write to the Board for information. The pamphlets sent were concise and lucid, and full directions were given as to how the various remedies should be applied. In France and Germany the farmers who wanted any information on a subject at once wrote to the agricultural department of their respective governments, and British farmers desiring information could not do better than follow their example.

Mr. G. CLARIDGE DRUCE pointed out that diseases occurred generally under artificial conditions, and when animals or plants were grouped together disease followed as a natural consequence. The same remark applied to forests, because so many trees of the same species were grouped together. He referred to the cultivation of the mid-European larch in immense quantities in Britain, the wood of which was now seriously attacked by diseases. They must not too lightly give up the cultivation of native species, for these had proved themselves fitted to bear our climate. He referred to the labours, in connexion with plant diseases, of Professor Marshall Ward, whose death they had great reason to regret;

but in Professor Weiss, they had good reason to believe, a worthy successor in this particular line of research would be found.

Dr. SYMES said he was deeply interested in the subject Professor Weiss had brought before them. He had made inquiries in regard to the use of sulphate of copper to the soil for potatoes and found its use was most successful. It would be interesting to know whether after this treatment the taste of the vegetable was in any way affected. It would also be interesting to know whether in face of the successful use of it for lettuce the prosecutions which occasionally occurred when traces of copper were found as colouring were at all consistent. He expressed himself as very interested in the observations on the effect of frost and cold on plants, and mentioned an instance where thousands of acubas were killed by frost in May, and yet these had survived the winter frosts. In conclusion, he thought the lecture was a valuable addition to their knowledge on that subject.

Mr. F. H. ALCOCK remarked that the disease of plants was a sore trouble in Worcestershire. In his garden thirty old black currant trees grew, and as these had not borne fruit for some years and appeared to be infected with a pest which prevented fruit appearing, the remedy was suggested to uproot and burn the lot. This plan, with the exception of one of the old trees, was adopted, and the reserved one, as an experiment, was well sprinkled during the winter with quicklime, the earth around it being also so treated, as suggested, he believed, by Mr. Collinge, of the Birmingham University (which had within the past few years established an economic branch of botanical study including this particular subject of plant disease and the cure thereof) and this year there appeared abnormally large-sized black currants of good flavour, which seemed to show that this, a somewhat more innocent remedy than those alluded to by Mr. J. R. Hill, might be more generally used with some advantage.

Dr. MCWALTER said the paper was of such vital importance that they might very well decide to give it rather more consideration than would otherwise have been the case. The subject was vital, not only because it concerned plant life, but because it also concerned humanity in general. He would like further information as to whether or not in the practice which at present prevailed so extensively of using poisons

to kill parasites the plants absorbed some of the poison, and in that way did harm to those partaking of them.

PROFESSOR WEISS, in reply, said it was a great pleasure to find the paper had elicited so much discussion; it showed the great interest taken in the subject. In reference to Mr. Tyrer's remarks, he was quite in agreement with him as to pharmacists and farmers utilizing the services of the Board of Agriculture. He did not think that any finer work had been done on the subject he had brought before the Conference than that of the late Professor Marshall Ward. In reply to the remarks on the cures for plant diseases, he thought the great thing which should be kept before them was to try and stamp out the causes of diseases, as that was of the highest importance. He quite agreed that the growing of plants in large masses was one of the factors in spreading diseases. In reply to the question as to the injury which might be caused by the use of sulphate of copper, he inclined to the opinion that the quantity used for that purpose was so infinitesimal that it was not very likely to injure health to any large extent.

THE BACTERIOLOGY OF PLASTERS AND PROTECTIVE TISSUES.

BY G. PINCHBECK, F.C.S.

In preparing this paper for the present Conference, I have had two objects in view—first, to ascertain the relative sterility of commercial samples of spread plasters and protective dressings, stored under and exposed to varying conditions, with the hope of drawing the attention of members, and, indirectly, pharmacists in general, to the desirability of dispensing these with care and discrimination, owing to their tendency to carry infection; and, second, to suggest, where practicable, modifications of existing formulæ so as to (*a*) reduce the liability to infection from pathogenic organisms during manufacture to a minimum, and (*b*) render the finished preparation as sterile as possible.

I will preface the details of my investigation with a few remarks on the employment of plasters in ancient and modern surgery. The use of plasters for the application of medicinal substances to the surface of the body is undoubtedly very ancient, as we find in the earliest records of medicine their employment recommended and their properties described.

Hippocrates, in his treatise on ulcers, gives minute directions for preparing all kinds of plasters, and advocated a cerate or adhesive plaster "containing a full proportion of resin." Even in so comparatively recent a period as the seventeenth century we find published formulæ for use in hernia, in dislocations and fractures, etc. Coming to more recent times, we find at the beginning of the Listerian era the use of adhesive plaster in the closure of wounds being abandoned. This change in the hitherto prevailing practice was in accordance with the aseptic treatment of wounds as used and advocated by Lister. It was found in practice that adhesive plaster not only interfered with the use of the antiseptic solutions employed, but was the cause of irritation and subsequent inflammation.

The evolution of aseptic methods caused the use of adhesive plaster to be discontinued, not only because of the reasons already mentioned, but more so by reason of the current expert opinion that the application of a non-aseptic plaster to an aseptic surface was to be avoided. During recent years, however, the art of plaster-making has advanced further in its evolution, and with the introduction of a rubber basis an aseptic plaster has been made possible.

That plasters should be as aseptic as far as it is possible to manufacture them is evident from the following rough classification of their employment in modern surgical methods, viz. :—(1) To produce physiological effects; (2) to procure protection, compression, retention, and rest; (3) to take the place of sutures; (4) for various special applications. In passing, it may be remarked that it is quite feasible, where poisoning has occurred from the application of lead or belladonna plasters, the symptoms were aggravated by the presence of the organisms of suppuration in or on the surface of the plasters named. This is a matter for clinical investigation in future cases of the type.

Part 1.

For the purpose of the paper, plasters may be divided into two groups, viz. :—(1) Simple adhesive plasters, and (2) compound adhesive plasters. The former are further split up into two classes, e.g., (*a*) water-soluble, and (*b*) water-insoluble. The latter are arranged in two sub-divisions, e.g., (*c*) lead, resin, or soap basis, and (*d*) rubber basis. Samples of material typical of this classification were obtained through the ordinary

commercial channels, and the results are arranged in tables to be described.

The following is an outline of the technique of the investigation :—Pieces of material measuring one square centimeter in area were cut off the samples, using aseptic precautions so as to prevent further contamination in any way, and placed in sterilized test tubes.

One mil. of sterile distilled water was then added. The tubes were agitated occasionally for one hour so as to ensure the surface of the plaster being thoroughly washed. Quantities measuring one, two, and five decimils were withdrawn and introduced by means of a sterile pipette into tubes of nutrient gelatin and agar media. From these dilutions, after agitation, Petri dish and Esmarch roll cultures were made. The cultures were incubated at 18°–22°C. (gelatin) and 37°C. (agar). The colonies were counted at the end of twenty-four hours, and again at the period of maximum growth. The time of incubation extended to seven days. Sub-cultures were prepared from suspicious looking colonies, and the bio-chemical features studied so as to identify the various organisms present. The media used (standardized, +10) were ascertained to be sterile by approved bacteriological tests. Controls were also made in each experiment, or set of experiments, so as to eliminate any chance of error from imperfect sterilization of the media or apparatus used. The results of the examination of the water-soluble types of simple adhesive plasters are given in Table 1 :—

TABLE I.

SIMPLE ADHESIVE PLASTERS.—A. WATER-SOLUBLE TYPES.

No.	Sample.	Description.	Condition.	Mean No. of Colonies per Sq. Cm.
I. 1–5	Isinglass	Roll; on muslin; packed in tin container	Broken package for sales	341
II. 6–11	Arnicated court	Piece; tracing cloth; in envelope	New stock	71
III. 12–16	Tri-colour court	Piece; on silk; in tablet	Old stock; soiled	620
IV. 17–20	Tri-colour	Piece; on silk; in tablet	Carried in vest-pocket for three months	1,420

As would naturally be expected from a consideration of the basis used, the water-soluble plasters are rich in bacteria. The basis for these is usually prepared from formulæ containing one or more of the following constituents—isinglass, gelatin, gum arabic, glycerin, or honey. Any one of these substances forms a valuable culture medium for bacteria. In addition, the basis is usually directed to be kept at a temperature of 50°–60°C., to harden it, which tends to favour development of spores.

It is obviously inadvisable to carry court plaster about in the purse or pocket, owing to the liability to further infection through development of spores, the body temperature supplying a condition equivalent to that of the incubator.

The following pathogenic and non-pathogenic organisms were determined in the foregoing experiments on the water-soluble plasters :—*Streptococcus pyogenes*, var. *albus* ; *Staphylococcus pyogenes*, var. *aureus* ; *S. pyogenes*, var. *albus* ; *Sarcinæ* ; *Proteus vulgaris* ; *Bacillus murisepticus* ; *B. pyocyaneus* ; *B. radiatus* ; *Mucorinæ* ; *Penicillium glaucum* ; *Aspergilli* ; and various yeasts.

TABLE 2.

SIMPLE ADHESIVE PLASTERS.—B. WATER-INSOLUBLE TYPES.

No.	Sample.	Description	Condition.	Mean No. of Colonies per Sq. Cm.
V. 21–26	Adhesive	Roll ; on calico wound on roller fixed in wooden box	Frequently handled for small sales	22
VI. 27–32	Soap	Roll ; glazed calico in tin container	Frequently handled for small sales	20
VII. 33–36	Rubber [1] adhesive	Roll ; wound on reel ; no covering	New stock	—
VIII. 37–40	Rubber [2] adhesive	Roll ; wound on reel ; no covering	New stock	—
IX. 41–44	Rubber adhesive	Roll ; wound on reel ; no covering	Opened for minor surgical ailments	7
X. 45–47	White rubber adhesive	Roll ; on cretonne in carton	New stock	—

[1] Taken from centre. [2] From outer layer.

The foregoing results are in marked contrast to those shown

in Table 1. The comparative freedom from bacterial infection of the samples of rubber adhesive is strikingly demonstrated, and lends support to the plea of certain manufacturers for its wider use in first-aid cases.

TABLE 3.

COMPOUND ADHESIVE PLASTERS.—A. LEAD, RESIN, OR SOAP BASIS.

No.	Sample	Description	Condition.	Mean No of Colonies per Sq. Cm.
XI. 48–53	Chalybeate	Roll; on calico	New stock	13
XII. 54–59	Belladonna	Roll; on swansdown	Shop soiled	53
XIII. 60–65	Cantharides	On adhesive plaster	Freshly spread	160

The high bacterial content of the cantharides plaster is, without doubt, due primarily to spores of organisms introduced with the powdered flies. The advisability of keeping the stock of plaster clean and fresh is obvious from the first two sets of experiments.

TABLE 4.

COMPOUND ADHESIVE PLASTERS.—B. RUBBER BASIS.

No.	Sample	Description	Condition.	Mean No of Colonies per Sq Cm.
XIV. 66–70	Capsicum	On linen, with muslin face cloth; perforated	New stock	5
XV. 71–76	Menthol	On linen, with face cloth; enclosed in envelope	New stock	—
XVI. 77–82	Belladonna	On linen, with face cloth; perforated	Old stock	31
XVII. 83–88	Belladonna and aconite	On linen, with face cloth; perforated	New stock	2
XVIII. 89–92	Opium	On linen, with muslin face cloth	New stock	17
XIX. 93–95	Zinc oxide	Plaster mull; in sealed cardboard container	New stock	—

The freedom from bacterial infection of sample No. XV. may be assigned primarily to the bactericidal action of the active constituent, and secondly, to the dust-proof container.

Age, as pointed out previously, materially affects the results. The degree of infection of No. XVIII. is no doubt influenced to a great extent by the nature of the active ingredient, as in the case of its prototype cantharides. Opium, as we all know, is exposed to contamination during collection and during the subsequent drying process.

TABLE 5.

PROTECTIVE TISSUES.

No.	Sample	Description	Condition.	Mean No. of Colonies per Sq. Cm.
XX. 96–100	Goldbeater's skin	Piece ; in envelope	New stock	24
XXI. 101–104	Goldbeater's skin	Piece ; in envelope	Carried in vest pocket three months	310
XXII. 105–107	Gutta percha	Piece ; in box	New stock	—
XXIII. 108–110	Gutta percha	Piece ; in box	Broken packages for sales	5

Goldbeater's skin resembles the water-soluble type of simple adhesive plaster in regard to bacterial content. This may be ascribed to several causes, e.g., (1) its avidity for water ; (2) use of septic membrane as a base ; (3) contamination during manufacture. To explain how easily infection may be introduced, and to emphasize the need for care in selection of membrane, as well as enforcement of strictly aseptic methods during manufacture, the following brief *resumé* of the process from Ure's "Dictionary" may be here appropriately given :—

Goldbeater's skin is prepared from the peritoneal membrane of the caecum of neat cattle. This, as soon as it is detached, is pulled out to the extent of 2 ft. and upwards, then dried. The dried membrane, which has the appearance of a piece of pack-thread, is then soaked in a weak alkaline solution and spread out on a flat frame ; another membrane is then taken and applied to the other, so that the two surfaces which adhere to the muscular membrane of the intestine may adhere together ;

they unite perfectly and soon dry. The skins are then glued to a hollow frame, washed with dilute alum solution, dried, washed with a solution of isinglass in white wine flavoured with spices, and varnished with white of egg. The material is finally dried, and is then ready for use.

In taking up the work involved in the foregoing portion of the investigation, I was prepared to find a luxuriant flora in the water-soluble plasters, as the colloidal basis used forms a pabulum in which they are able to flourish, but not to any real extent in the water-insoluble plasters, and therefore it was with a certain amount of surprise that I viewed the results obtained. These figures give a fair idea of the extent to which commercial plasters are sterile.

It occurred to me at this point that it would be interesting to bacteriologically examine freshly prepared samples of the official plasters; and with this object in view I prepared samples under as aseptic a condition as is obtainable in the atmosphere of a pharmaceutical laboratory. The plasters in every case were found to be septic.

CONCLUSIONS.

The results obtained in the foregoing experiments warrant the following conclusions—viz., that (*a*) all plasters, unless sterilized, are septic; (*b*) the degree of sterility is diminished by atmospheric exposure.

PART II.

In pursuance of the second part of my investigation (which is at present incomplete) I will now proceed to discuss the most effective method of rendering plasters aseptic. Sterilization may be accomplished by employing heat, solvents, chemicals, or fractional sterilization.

STERILIZATION BY HEAT.

Dry heat, as ordinarily applied, is unsatisfactory, the plaster-mass being affected injuriously. Taking an official example, e.g., Emplastrum Resinæ, the resin is decomposed, and the plaster when applied to the skin produces an eruption which interferes with the retention of the dressing.

Sterilization with Solvents.

Washing the surface of the plaster with a solvent, e.g., chloroform, tends to alter the character of the material and to induce irritation of the skin. Rubber plaster is affected similarly.

Chemical Sterilization.

Chemical sterilization may be universally used, insomuch as chemical or physical change, which occurs to a greater or less extent in the processes already enumerated, is reduced to a minimum in the resultant plaster-mass. The process consists in the addition of a germicide to the plaster-mass during manufacture. The germicidal agent may be either added to the mass maintained for a little while in a state of liquefaction, or when cold. In the first instance, if the germicide is volatile, a further addition, if found necessary by experiment, may be made before making into a roll or before spreading, to compensate for loss sustained. This modification is to be preferred, as the plaster is more thoroughly sterilized owing to greater penetration.

I have found that chemical sterilization applied to plaster is more effective at 35·5°–65°C. than at ordinary temperature, and the shorter the time of exposure, the less the degree of sterilization attained. As may be presupposed, there is a wide difference between the relative activity of a chemical disinfectant or germicide in aqueous solution and the same in a complex carbohydrate quasi-solvent. The bactericidal or inhibitory action of a chemical disinfectant on plasters is governed to a large extent by its penetrative or diffusive power in the basis or quasi-solvent. Volatile sustances like the alphyl or aryl esters, phenols, essential oils, etc., are very active germicides.

It is not such an easy task as may at first be supposed to choose a suitable germicidal agent which will fulfil the conditions that I have raised, as in selecting suitable reagents for experimental work, the following considerations must be kept in view :—(1) The germicide must have little or no toxic effect on absorption by the skin ; and (2) produce a minimum amount of physical or chemical change in the plaster-mass.

Certain germicides, e.g., salicylic acid, are to be avoided, as the minimum amount frequently necessary for adequate sterilization is sufficient to produce a skin rash and intense irritation or

inflammation when applied to sensitive cuticle or newly formed tissue.

The following examples may be cited as suitable substances to employ for sterilization, viz., thymol, chlor-butyl alcohol, iodol, beta-naphthol, methyl, ethyl, and amyl salicylates. After numerous experiments, working with a rubber basis containing various combinations, I have found an addition of 0·4 per cent. of thymol and 0·6 per cent. of methyl salicylate to effectually sterilize the plaster-mass. The methyl salicylate is added to the plaster-mass, maintained for about an hour at 65°C., and the addition of the thymol made on cooling.

Water-soluble plasters, e.g. court plasters, are best rendered sterile by the addition of 1 per cent. of phenol to the basis previous to coating. The use of this type of simple adhesive plaster is from a bacteriological point of view to be condemned, owing to moisture being required to render it adhesive. In ninety-nine cases out of a hundred this is supplied by the lips, thus rendering the plaster septic, which proceeding minimizes any healing property it may possess, and frequently causes suppuration. A liquid court plaster based on a solution of triacetyl-cellulose, or gutta-percha, in chloroform or benzene would form a very efficient substitute.

The comparative freedom of commercial samples of rubber adhesive plaster, when wound on reels, may no doubt be attributed to the small amount of surface exposed, and possibly also to the germicidal action of the solvent or solvents used for incorporating the indiarubber. There is little doubt that a rubber combination fulfils the present day requirements of surgical technique better than the official plasters prepared with a lead, resin, or soap basis. This is largely because of its extreme adhesiveness and freedom from irritating properties. Purified indiarubber, i.e. Para rubber freed from foreign substances by careful grinding and washing, possesses qualities which make it the most desirable substance to include in a plaster-mass. It is neutral, strong, waterproof, and fairly stable, and when properly prepared, adhesive at body-temperature.

None of the published formulæ for rubber plasters which I have tried have satisfied the ideal requirements of what a rubber plaster should be. The formula for adhesive plaster adopted by the U.S.P. authorities is far from being satisfactory. Heat, as I will show, should never be used for incorporating rubber with gums or fats. In this particular instance the rubber is directed

to be melted at a temperature not exceeding 150°C., and then incorporated with an equal amount of soft paraffin, finally adding the lead oleate. This process fails to produce either a smooth or permanently adhesive plaster, as the temperature required to melt the rubber causes it to become brittle and lose its elasticity.

Rubber belongs to the class of carbohydrate colloids, and exhibits peculiar physical behaviour under certain conditions, some phases being as yet little understood. Although no perceptible decomposition takes place even at high temperature, indiarubber undergoes a great change. It becomes soft and sticky, loses its former elasticity, and exhibits brittleness resembling bitumen. Weber suggess this is due to the breaking up of the no doubt very large indiarubber molecule into smaller molecules of the same empirical formula. The chemical or molecular change is comparable to the conversion of paraldehyde into aldehyde.

On the other hand, when indiarubber in quasi-solution is subjected to similar conditions, it is not affected to the same extent. Gladstone and Hibbert (*Proc. J.C.S.*, 1888, p. 686) heated a "solution" of rubber in toluene to 200°C. for two hours, and after distilling off at 112°C. found the residue unaltered.

After a good deal of experimenting, I find that a combination of rubber with wool fat, tallow, Japan wax, and resin, yields a mass which spreads easily and is permanently adhesive. The fats in the basis are used in such a proportion as to counteract and exclude any possible irritating effects on the skin contributed by the resin. A small quantity of sesame oil or glycerin is added to prevent the plaster from becoming dry and brittle from atmospheric action. The indiarubber is added in the form of a quasi-solution, prepared by macerating washed rubber in five times its weight of benzene.

The following formulæ for aseptic rubber plasters are founded on the basis mentioned. It is to be noted that the descriptive term aseptic, as applied to the formulæ given, is used in a restricted sense.

The plaster-mass prepared and sterilized according to the method advocated is undoubtedly sterile, but the ultimate freedom from micro-organisms—i.e., the aseptic value—is in a great measure dependent upon the conditions under which the subsequent operations are carried out.

Aseptic Rubber Adhesive Plaster.

Resin	4 parts
Japan Wax	1 part
Benzoated Beef Tallow	8 parts
Anhydrous Wool Fat	3 ,,
Washed Indiarubber	2 ,,
Sesame Oil	1 part
Lead Oleate (Precipitated)	80 parts
Methyl Salicylate	0·6 part
Thymol	0·4 ,,

Melt the resin, tallow, wool fat, and wax together; then add the rubber "solution" previously mixed with the oil. After recovery of the benzene by distillation the whole is strained through three or four thicknesses of gauze, and the lead oleate, previously melted, added. The plaster-mass is then sterilized with the methyl salicylate and thymol as previously described. The plaster is spread on sterile material—e.g., shirting, cretonne, etc.—observing aseptic precautions; allowed to dry in a dust-free atmosphere. Cover the plaster with sterile gauze, and pack in sterile air-tight containers.

Aseptic Cantharidin Plaster.

Cantharidin	0·1 part
Chloroform	a sufficient quantity
Anhydrous Wool Fat	15 parts
Washed Rubber	10 ,,
Benzoated Beef Tallow	43·9 ,,
Resin	20 ,,
Japan Wax	5 ,,
Sesame Oil	5 ,,
Methyl Salicylate	0·6 part
Thymol	0·4 ,,

Dissolve the cantharidin, by the aid of heat, in as small a quantity of chloroform as possible; then add the sesame oil and the wool fat (previously melted). Incorporate with the rubber, resin, tallow, and wax, previously combined as directed under adhesive plaster. Sterilize with the salicylate and thymol, and proceed as described before.

Aseptic Capsicum Plaster.

Liquid Extract of Capsicum (1=2 drug)	10 parts
Anhydrous Wool Fat	15 ,,
Washed Rubber	10 ,,
Benzoated Beef Tallow	39 ,,
Resin	20 ,,
Japan Wax	5 ,,
Sesame Oil	5 ,,
Methyl Salicylate	0·6 part
Thymol	0·4 ,,

Evaporate the alcohol from the fluid extract (Gerrard's form., B.P.C., 1905), and add to the melted wool fat and oil. Incorporate the mixture with the combined rubber, resin, tallow, and wax. Then proceed as described under adhesive plaster. This plaster contains 5 per cent. of solid extract.

Aseptic Zinc Oxide Plaster.

Zinc Oxide	20	parts
Resin	15	,,
Japan Wax	4	,,
Benzoated Beef Tallow	25	,,
Anhydrous Wool Fat	15	,,
Washed Rubber	8	,,
Glycerin	12	,,
Methyl Salicylate	0·6	part
Thymol	0·4	,,

Sift the zinc oxide and make into a paste with the glycerin. Add the paste to the resin, wax, wool fat, tallow, and rubber combined as described under adhesive plaster. Sterilize with the methyl salicylate and thymol as previously directed, and proceed as described in the case of adhesive plaster.

Fractional Sterilization.

Discontinuous or fractional sterilization is only applicable where the plaster-mass is not materially altered, physically or chemically, by the prolonged temperature to which it is exposed. The process, introduced by Tyndall, consists of heating to a temperature of 54° to 56°C. for three or four hours daily during the week, in a chest with double walls between which there is a layer of water, the temperature being maintained at a constant height by means of the thermo-regulator.

As the temperature of fractional sterilization is kept above 54°C., the choice of suitable fats is limited, the majority of the commonly used melting at fairly low temperature, and the use of resin and substances of a like nature not being permissible owing to decomposition.

In order to arrive at a suitable working formula which would withstand the temperature of sterilization, experiments were made with various combinations of rubber, fats, and oleates, including those of lead, zinc, and aluminium. The following formula yields a plaster-mass which is easy to spread, does not run on heating, and is without any deleterious dermatological effect :—

STERILE ADHESIVE PLASTER.

Washed Rubber .	12	parts
Carnauba Wax .	8	,,
Anhydrous Wool Fat	30	,,
Glycerin . .	10	,,
Zinc Oleate . .	40	,,

Melt the wool fat and wax together, and then mix with the rubber solution. Recover the benzene by distillation. Mix the zinc oleate, previously sifted, with the glycerin so as to form a paste, and add this to the rubber, wax, and fat. Heat till of proper consistence, and spread on linen; allow to dry, observing aseptic precautions, and cut up in strips. Place the strips, adhesive side down (leaving a space between each) on sterile gauze. Wrap in grease-proof paper, then enclose in envelopes and seal. Sterilize by the fractional method already described.

The only objection to this process is that spores of micro-organisms possessing a thermal death point higher than the temperature attained would escape destruction. For all practical purposes, however, this process provides a very efficient way of sterilizing plasters.

In conclusion, it may be suggested that, in view of the summarized conclusions deduced from the results of the bacteriological examination of plasters, given in Part I of this paper, the official plasters should be deleted. I do not go quite so far as Marpmann (*Journ. Pharm. Chim.* [6], 20, 311), who having found bacteria in plasters, recommended that they should be abolished, lock, stock, and barrel, but would suggest that improved formulæ, founded on a rubber basis and sterilized by one of the methods described, should be introduced into the next Pharmacopœia. Plasters, as I have shown, are necessary in modern surgical practice, and efforts should be made to render them as perfect, considered both from a pharmaceutical and bacteriological standpoint, as it is possible to make them. I wish to add that the experimental work in connexion with this investigation was carried out in the laboratories of Messrs. Hough, Hoseason and Company, to whom thanks are due.

Dr. McWALTER said they should be grateful to the author of this paper. It was a very important subject, because any plaster is liable to excite dermatitis. It behoved the pharmacist to supply a plaster which might be reasonably suitable—especially as in view of the Employers' Liability Act and other Acts

people began to get a little fond of litigation. Of course, while the plaster as supplied by the pharmacist might be all right, trouble might arise by the patient neglecting to cleanse the skin.

Mr. PINCHBECK, in reply, said he had found pathological forms of micro-organisms in both simple and compound adhesive plasters, more especially in the water-soluble types.

NOTE ON THE DECOLOURIZING ACTION OF ANIMAL CHARCOAL.

BY PROFESSOR EDMUND KNECHT, PH.D., M.SC.TECH., F.I.C.

The first published account relating to the use of animal charcoal for decolourizing liquids is that of Figuier in 1811. Lowitz had previously shown that ordinary charcoal could be used for such purposes, but the enormous advantages gained by Figuier's discovery soon led to its general adoption on a large scale. Most of the animal charcoal which comes into the market is made from bones, but some is also made for laboratory and for special use from blood, flesh, and sponge. All these products naturally contain the whole of the mineral matter of the raw material, which in the case of bone charcoal amounts to some 90 per cent., whereas in blood charcoal the ash does not as a rule exceed 10 per cent. A good deal of the ash can be removed by repeated extraction with strong hydrochloric acid, but a considerable residue resists this treatment, and I find that in order to reduce the ash to a minimum it is necessary to resort to the use of hydrofluoric acid. Thus, blood charcoal which had been repeatedly extracted with hot strong hydrochloric acid was found to contain as much as 5·6 per cent. of ash, consisting principally of ferric oxide (96·7 per cent.). After digesting for some hours in a platinum vessel with strong hydrofluoric acid, the amount was reduced to 0·6 per cent. By similarly treating bone charcoal I found it possible to reduce the ash in the product (dried at 200°) to 0·4 per cent. The black substance thus obtained may be taken to represent that "modification of carbon" which is referred to in all textbooks and manuals as animal charcoal, a substance imbued with a number of remarkable properties, of which that of decolourizing liquids is but one. It is this property alone which is being taken into account in the present investigation. It has always appeared to me that the behaviour in decolourizing of charcoal prepared from a vegetable source, such as cellulose or sugar on the one hand, and that prepared from animal matter on the other, offers an incongruity of which there

has hitherto been no explanation. It is simply assumed that the two different forms of the "element" carbon show different properties, and this in spite of the published statement of Violette that wood charcoal prepared at a temperature of 103° only contains 82 per cent. of carbon, the rest being ash (1·5 per cent.), hydrogen, oxygen, and nitrogen. I have so far only done one estimation of nitrogen (all these estimations were done by the Kjeldahl process) in wood charcoal, but found no more than a trace. In all the animal charcoals which I have hitherto examined, however, I find this element to be present in quantities varying from 5 to 7 per cent., while sulphur is also found to be present to the extent of about 0·5 per cent. It is impossible to regard these constituents as casual impurities, and I think that we have here the key to the hitherto unexplained difference in the behaviour of vegetable and animal charcoal towards colouring matters. I have not yet succeeded in eliminating the whole of the nitrogen from animal charcoal, but by heating some of the product containing 0·6 per cent. of ash in a current of purified dry hydrogen to redness for thirty-two hours I was able to reduce the percentage from 5·76 to 3·61. The two samples were then "dyed" with a known amount (a large excess) of an acid dye-stuff of known constitution—viz., crystal scarlet. The dyeing was conducted at the temperature of the water-bath for one hour, the dye-stuff solution being acidulated with an equal amount of sulphuric acid in each case. The excess of dye-stuff was then estimated in each case in the filtrates by means of titanous chloride. The experiment revealed a remarkable result, inasmuch as the amount of colouring matter taken up was almost exactly in proportion to the percentage of nitrogen present in the animal charcoal. In another experiment the animal charcoal used was ordinary bone charcoal, which had been purified by extracting twice in succession with strong hydrochloric acid. It contained, after drying at 200°, 9·87 per cent. of ash. Some of the sample was strongly heated in a bulb of Jena glass in a current of hydrogen for thirty minutes, when the percentage of nitrogen was found to decrease from 5·6 to 4·3 per cent. Here, also, the amount of colour taken up in dyeing was directly proportional to the percentage of nitrogen in the animarl charcoal. At the present juncture I would not venture even to surmise in what form the nitrogen is present in animal charcoal. That it is very firmly held is shown by the fact that two hours' boiling with caustic soda of 66° Tw. only eliminated a very small proportion

of it as ammonia. The investigation is being continued, and may possibly lead to some interesting results. This communication, which I regard as being of a purely preliminary character, is simply made with the object of securing priority for two points —viz., that animal charcoal contains a considerable amount of fixed nitrogen, and that its decolourizing action on a typical acid dye-stuff such as crystal scarlet is in a direct ratio to the amount of nitrogen contained in the animal charcoal.

Mr. W. A. H. NAYLOR spoke in reference to blood charcoal, with a view to its purification. Was it as effective as an oxygen carrier, as they were accustomed to suppose good commercial charcoal was as at present purified?

Mr. H. FINNEMORE said that after a time a charcoal ceases to decolourize, but by heating in closed vessels the decolourizing property is again increased. Could the author explain it?

Professor KNECHT, in reply, said he had not gone very fully into the effect of the percentage of nitrogen on the catalytic action. In the instances quoted catalytic action had apparently played a very unimportant rôle, since he had been able to show that the absorbed colouring matter could be almost quantitatively extracted from the "dyed" animal charcoal by treatment with ammonia. He had not found that heating improved the decolourizing power of animal charcoal.

The PRESIDENT said charcoal revivifying by heat was done on an enormous scale in sugar factories. One of the objects was to reduce purchases of original bone charcoal to the smallest amount. By reworking a certain amount of deterioration occurred. His own view was that the nitrogen contents had nothing to do with the decolourizing effect.

AN IMPROVED FORM OF LIQUID EXTRACT OF CASCARA SAGRADA.

BY J. H. FRANKLIN.

In the course of a number of experiments, started with the object of providing a formula for miscible liquid extract of cascara, which should be superior to those formulæ already published, and certainly not less active than the official preparation, the following was tried:—

Cascara Sagrada, in No. 20 powder . . .	20 oz.
Glycerin	8 fl. oz.
Strong Solution of Ammonia	80 minims.
Distilled Water, a sufficient quantity.	

Moisten the cascara sagrada with 15 fl. oz. of the distilled water and set the mixture aside for six hours; then pack it loosely in a percolator and percolate with more of the distilled water until the powder is exhausted; evaporate the percolate to 12 fl. oz., cool, add the glycerin, allow to stand, filter, and add to the filtrate the strong solution of ammonia.

The liquid extract as made by the above formula, without the addition of the solution of ammonia, was miscible with water, but the mixture had lost its brilliancy in about thirty minutes. The well-known action of solution of ammonia on liquid preparations of cascara was then tried, and it was found that the addition of 4 minims of strong solution of ammonia to each fluid ounce of the liquid extract had the effect of making it perfectly miscible with water in all proportions, and the mixture remains bright as long as it keeps good. The preparation, even with this quantity of ammonia, has only a very faintly ammoniacal reaction, and apparently answers all possible requirements for a miscible liquid extract, and has the following distinct advantages over the B.P. formula. It is richer in colour, more palatable, does not deposit on keeping, is perfectly miscible with water, and can be dispensed without the formation of the unsightly precipitate which is thrown out when the British Pharmacopœia liquid extract is diluted. It is also less costly to prepare than the latter, and is probably more active, although no claim is made for it in this respect When the glycerin is added to the evaporated percolate it dissolves some of the deposit produced by the application of heat during evaporation, and this probably accounts for the supposed increased action as a laxative, and also for the ease with which the product can be filtered. When used in the preparation of aromatic syrup of cascara it avoids the unsightliness and consequent filtration necessary to supply this galenical in a presentable condition. A very considerable increase of the alkali over the quantity recommended does not apparently interfere with the activity of the drug, and therefore, considering that this is probably the most economical, the simplest, and most perfect formula yet put forward for a miscible liquid extract of cascara, its importance to the medical profession, the pharmacist, and the public, and considering also its advantages from every point of view over the present official one, it is respectfully suggested that the formula is worthy of consideration for inclusion in the forthcoming Pharmacopœia.

Mr. FRANKLIN explained that the result of this simple process is so satisfactory as a miscible liquid extract that it was decided to bring this small contribution before the Conference, with a view to ascertaining if the suggestion of changing the preservative in the official preparation to glycerin was favourably received. In any case, some change must of necessity be made in the B.P. formula, as it always deposits, and occasionally ferments and is unsightly when diluted with water or used in the dispensing of prescriptions. No reference was made to other published papers on this subject, although attention might be called to Mr. Edmund White's process for a *tasteless* extract, communicated to the Conference in 1902.

A NEW METHOD OF PREPARING SACCHARATED CARBONATE OF IRON, AND ITS SUGGESTED USE IN PHARMACY.

BY J. H. FRANKLIN.

Ferrous Sulphate	26 oz.
Liquid Glucose	8 oz.
Sodium Carbonate	28 oz.
Distilled Water, boiling, a sufficient quantity.	

Dissolve the ferrous sulphate and 4 oz. of the liquid glucose in 4 pints of the distilled water, and the sodium carbonate in 2 pints of the distilled water; add the former to the latter, stirring constantly, then add 6 pints of the distilled water, mix, cover, and allow the precipitate to settle, separate the supernatant liquid, twice repeat the process of washing and separation, using 8 pints of the distilled water each time. Mix the precipitate with the remaining 4 oz. of liquid glucose, evaporate on a steam bath as far as possible, dry quickly in a drying chamber, and reduce to a fine powder.

A batch prepared by the above method was tested periodically, along with a freshly-prepared sample of the B.P. formula, with the following results:—

Date.	Percentage $FeCO_3$. New Formula.	Percentage $FeCO_3$ B.P. Formula
March 8, 1907	66.5	34·6
April 8,	66·4	34·6
,, 23,	66·2	34·4
May 8,	66·2	34·3
,, 28,	65·3	34·0
June 25,	65·3	33·25
July 8,	65·2	32·45

The maximum and minimum percentages obtained were :—

New Formula.	B.P. Formula.
66·5	34·6
65·2	32·85

Both were kept on the laboratory bench in bottles somewhat loosely corked.

The sample prepared by the suggested formula, and kept for four months in a full, carefully-sealed bottle tested :—

Date.	Percentage $FeCO_3$.
March 8, 1907	66·5
July 8, ,,	66·4

The above figures show that the preparation keeps perfectly in a well-closed bottle, and even in one partly filled the loss is not very considerable, the depreciation being rather less in the stronger specimen, although it suffered some disadvantage; owing to repeated samples being taken from the bottle, so that eventually the container was only about one-fourth filled, whilst the vessel containing the B.P. preparation was practically full. As the idea underlying these experiments is to obtain, if possible, a compound containing at least 66 per cent. of ferrous carbonate, or, preferably, 69 to 70 per cent. to allow for depreciation, a batch was tried by the same formula, increasing the ferrous sulphate to 26½ oz., and washing the precipitated carbonate with *three* separate lots of boiling water, instead of two washings, and this was found to test 69·4 per cent. ferrous carbonate.

Both of the batches contained a heavy trace of sulphate, and two further lots were tried, using the increased quantity of ferrous sulphate, and substituting a sufficient quantity of ammonium carbonate for the sodium salt. These tested 59·3 per cent. and 64·9 per cent. ferrous carbonate respectively, this being accounted for by the greater bulk of the carbonate of iron which results when ammonium carbonate is employed as precipitating agent, the glucose not exerting its preservative properties to the same extent in the increased volume of powder. The sulphate of soda retained in the product is not considered seriously objectionable, and the stronger of the two batches, prepared with sodium carbonate, was mainly used in the preparations referred to later. Several experiments were tried with increased quantities of glucose and a mixture of cane sugar and glucose, but they were rather hygroscopic, and were not proceeded with. The product is a free dry powder, which keeps

well, is twice the strength of ferrous iron as compared with the B.P. preparation, and is distinctly greener than the latter, either when freshly prepared, or after it has been kept for four months, and these results, it is important to note, are obtained with less labour than is necessary to convert an equal amount of ferrous sulphate into carbonate by the process recommended in the official monograph. The increased concentration of the ferrous salt in the compound may not be considered of much advantage, but when we take into account the convenience arising from its use at the dispensing counter and in the laboratory, in compounding the numerous combinations of Blaud's Pills with strychnine, quinine, arsenic, cascara, etc., in the form of pills, tablets, and capsules its usefulness is at once manifest, and the following formulæ have been constructed to show how it can be easily applied in the dispensing of a number of important galenical preparations containing iron.

Iron Tablets.

Saccharated Carbonate of Iron . . . 1,000 grains.

Liquid Glucose } equal parts, a sufficient quantity.
Water . . . }

Lubricant, a sufficient quantity.

Granulate with the liquid glucose and water, dry, and add the lubricant to produce 1,056 grains.

Press into tablets $1\frac{1}{5}$ grains each.
Press into tablets $3\frac{1}{5}$ grains each.
Press into tablets $4\frac{1}{5}$ grains each.

The above tablets represent one, two, and three Blaud's Pills respectively. The tablet representing one Blaud's Pill, after keeping for one month in an open cardboard box, tested 0·955 grain ferrous carbonate per tablet (average of twenty). The granulating and drying is a severe test, and a little depreciation may be expected, but the loss would be more than compensated for by dividing 100 grains into sixty, instead of sixty-six, tablets, according to the following formula, in which the glucose is increased :—

Saccharated Carbonate of Iron . . . 1,000 grains.

Liquid Glucose, 3 parts } a sufficient quantity.
Water, 1 part . . }

Lubricant, a sufficient quantity to make 600 tablets, each containing :—

1 grain ferrous carbonate.

The tablets quickly disintegrate in cold water.

Iron Pills.

Saccharated Carbonate of Iron	648 grains.
Liquorice Root in powder . . .	162 „
Liquid Glucose	216 „
Water	54 „

Make a mass.

Cut into pills, 2½ grains each = Iron Pills of B.P. strength.
Cut into pills, 5 grains each = Iron Pills of Double strength.
Cut into pills, 7½ grains each = Iron Pills of Triple strength.
The pills readily soften in cold water.

The formula is much more simple than the official one, and there is not any waiting for the completion of the reaction, as in the B.P. process, and the resulting pills are smaller than Blaud's Pills, even the triple pills being only slightly larger than the latter. Kept in an open cardboard box for one month, the small pills test 1·005 grains ferrous carbonate per pill (average of twenty). The liquorice powder is used to counteract the tendency the pill has to lose its shape if massed with glucose alone.

Iron Capsules.

Saccharated Carbonate of Iron . . .	900 grains.
Soft Paraffin	600 „

Mix thoroughly, and fill into capsules.
5 grains is equivalent to 2 grains ferrous carbonate.

The capsules kept for three months in an open box, tested 1·965 grains ferrous carbonate (average of twenty). The combinations of arsenic, strychnine, etc., previously mentioned, can of course, be easily combined in the above formulæ.

Compound Iron Mixture.

Saccharated Carbonate of Iron . . .	16 grains.
Syrup of Glucose	3 fluid drachms.
Gum Acacia, in powder	20 grains.
Tincture of Myrrh	4 fluid drachms.
Spirit of Nutmeg	50 minims.
Rose Water	a sufficient quantity.

Reduce the saccharated carbonate of iron to a fine powder, triturate with the syrup of glucose and continue the trituration with a few drops of rose water to form a smooth thin paste. Gradually add more of the rose water, and add the acacia diffused in the tincture of myrrh and spirit of nutmeg, finally making the product measure 10 fluid ounces with rose water.

This is made in half the time required to complete the B.P. process for compound iron mixture, and the result is a paler emulsion, which does not oxidize nearly as rapidly as the latter. The colour is, perhaps, not as attractive when freshly prepared as the official preparation, but it retains the original colour for a much longer period in partly filled bottles, and has much to recommend it to the pharmacist.

Mr. H. FINNEMORE remarked that Mr. Franklin expressed the opinion that cascara sagrada did not lose its activity when mixed with ammonia. His opinion was that the taste gradually went, and very possibly the medicinal action disappeared. An old cascara mixture containing sal volatile given to a patient had no effect whatever, but very possibly this depended almost entirely on the state of the patient. He had often been asked to prepare a concentrated Blaud's Pill, and for this purpose he mixed the exsiccated salts with lactose. Another way of making concentrated Blaud's Pill was to take the exsiccated salts, granulate separately, and compress into tablets.

Mr. F. H. ALCOCK suggested the addition of solution of ammonia before the addition of the glycerin, and filtration. He was also able to say that alkaline solutions of cascara in time lost their bitterness. He would like to add an interesting observation made by an eminent Birmingham surgeon that he, during operations, was always able to tell a patient who had used cascara for some time—it rendered the intestines more tough. With reference to the ferrous carbonate paper, he desired to say that the amount of ferrous iron was not a measure of the amount of ferrous carbonate in Blaud's Pill, for it might come from ferrous sulphate or oxysulphate, nor was the amount of carbonic acid a criterion, for that might come from undecomposed sodium bicarbonate. Indeed, he did not know that there was as yet a really good means of determining the amount of ferrous carbonate in Blaud's Pill.

Mr. HAROLD WYATT said the sensible use of ammonia was a valuable thing, dissolving, as it did, glycyrrhizin in liquorice and similar instances. The only instance in which it did not act properly was when ammonia had been in excess, deterioration taking place by oxidation in alkaline solution. It was a decided advantage in podophyllin preparations. Non-active extracts had been obtained when excess of ammonia had been used. An almost infinitesimal amount of ammonia, as proposed by Mr. Franklin, was a decided advantage. Among the notes in *The Pharmaceutical Journal*, which one often saw in odd places, there was one on the subject of Blaud's Pills some years ago, and Mr. Franklin's process came as near to it as possible.

Dr. SYMES said that alkali acted upon bitter resins and reduced their bitterness. Decoction of aloes kept for twelve months had a different taste from the fresh decoction. He himself made it in successive batches to attain this object, but the

question arose as to whether it was quite as active. He was rather inclined to think that the same remark applied to cascara. The cascara in presence of alkali might in time lose some of its aperient properties. With regard to ferrous carbonate, he suggested, many years ago, adding sugar to the water for washing the precipitate, with a view to preventing oxidation.

Dr. H. A. D. Jowett said he would like to enter an emphatic protest against the statement of the active principle of cascara being in the nature of resin. It was not known to what body its activity was due. He had isolated a substance which was soluble in alcohol and water and was exceedingly active, but had been unable to obtain it in a crystalline condition, and it was certainly not what was called a resin. In order to get the active principle of the product it was necessary that the substance isolated should be a crystalline body, or a derivative of such. He wanted to know whether Mr. Franklin had actually tested the preparation, and his reason for stating that the increased activity might be due to some of the deposit being taken up by the glycerin. He himself did not think so. If the active principle were an anthra-quinone derivative, as seemed possible, the behaviour with ammonia might be understood, but there was nothing to be gained by speculating about its composition until more experimental evidence was available.

Mr. J. P. Gilmour said he had tried Mr. White's process for the miscible extract and found the product to be certainly as active as, if not more so than, the B.P. preparation.

Mr. Franklin, in reply, referred to Dr. Jowett's question as to the activity of the extract, and said it was difficult to get these things tried satisfactorily, but the preparation had been tested very carefully indeed, and the consensus of opinion was that it was somewhat more active than the official one, and the glycerin, being a laxative, would probably help in this direction. In regard to Mr. Finnemore's, he said it was an ordinary liquid extract made by a simpler process than that of the B.P., and was not intended for a tasteless extract, the ammonia being used on account of the increased miscibility it imparted, and the quantity recommended was, of course, too small to give a tasteless liquid extract as it just neutralized the natural acidity of the drug. He had not tried adding ammonia along with the glycerin, but this was not likely to affect the result. It was noticed that after the addition of the solution of ammonia, solutions of the liquid extract in water kept longer, and the

only objection that could be found to the use of the alkali was that it partly covered the natural aroma of the drug. With regard to the remarks on ferrous carbonate, putting the exsiccated salts together was hardly producing Blaud's Pills or tablet. Answering Dr. Symes, Mr. Franklin said he had used glucose in the washing, and it prevented oxidation much more effectually than sugar.

THE PUNGENT PRINCIPLE OF GINGER.—PRELIMINARY NOTE.

BY HENRY GARNETT, F.C.S., AND JAMES GRIER, M.Sc.

Since the work of Thresh in the years 1879 to 1884 there does not appear to be any published work on the pungent principle of ginger, to which Thresh assigned the name of gingerol. Our knowledge of the chemistry of the volatile oil of ginger is fairly complete, having been worked out by (amongst others) Thresh, and more recently by Soden and Rojahn (1900). The object of the present inquiry has been to throw further light on the nature of the pungent principle, and if possible, to devise a method for its separation and estimation in different varieties of ginger, ginger extracts, etc. Up to the present it has not been found possible to carry out the latter part of the work.

No attempt has been made to examine the essential oil, nor have the various soluble constituents described by Thresh been examined, except so far as they have affected the separation of the pungent principle.

In examining the published accounts of Thresh's work, one is struck with the thoroughness of his work as far as he carried it, and we have been able to confirm the general accuracy of his statements. He does not appear, however, to have attempted to characterize his "gingerol"; indeed, he explains that he was unable to isolate a pure body. On the other hand, he made some experiments with regard to its oxidation products, among which he claimed to have recognized caproic and acetic acids.

In an inquiry by one of us (Garnett) some four years ago, it was evident that the pungent principle of ginger, for which we propose to retain the name of "gingerol," had marked phenolic properties, and it was hoped that these might be utilized to purify it still further, as well as to prepare some well-defined derivatives. It has been found possible to isolate the total phenolic constituents, and to free them from all other bodies of a non-phenolic

character. We have not yet satisfied ourselves, however, that the phenols so isolated are chemically homogeneous, or that they are all physiologically active. In particular, a reddish-brown colouring mater adheres with great persistency to the active principle. We have been much impressed with (*a*) the stability of the phenol under ordinary conditions, and (*b*) its instability when in alkaline solution. At one period the work was unfortunately delayed, and a quantity of the phenol which had been allowed to stand in alkaline solution was found on separation to have lost all its pungency, and to have become converted into inert resinous and fatty products. But for the delay thus occasioned we had hoped to have been able to present a much more complete account of the gingerol than is now possible. In the last resort, after failing to produce any well-defined derivatives from which a pure product might be regenerated, and as the phenolic body showed no signs of crystallizing, it was decided to attempt its distillation under reduced pressure. A small portion (about 5 Gm.) was, therefore, distilled in a flask under a pressure of 18 Mm. of mercury. Although there was apparent decomposition during the distillation, a considerable quantity of distillate was obtained as a clear viscous oil of a pale straw colour, distilling within a range of 235°C. to 250°C. This, when redistilled under the same reduced pressure, came over unchanged. It could not be assumed, however, without further proof, that this body was not either a product of destructive distillation, or that it was not contaminated with such products. We think the evidence is in favour of its being chiefly unchanged "gingerol," and that it existed as such in the original substance. It was noted, in support of this, that (*a*) both the original impure body and the purified distillate had the same pungent taste, though tbe latter was the more active (*b*) both gave a greenish colour with ferric chloride in alcoholic solution, (*c*) both dissolved without residue in 1 per cent. NaOH, (*d*) both gave similar precipitates with bromine.

In a later experiment the crude phenols were further purified by boiling with petroleum ether (boiling point 36°C. to 50°.) under a reflux condenser, and rapidly decanting the liquid while hot, as it deposits gingerol on cooling. About 7 Gm. of the pale reddish oil so obtained were distilled under a pressure of 18 Mm., as before. On this occasion the distillation took place without any apparent decomposition, the product being a pale yellow, thick viscous liquid. This sample began to distil at

180°C., the thermometer rising quickly to 240°C., and then more slowly to 250°C. It is, therefore, evident that the gingerol described by Thresh is not a simple body, and that, therefore, the combustions carried out with a view to obtaining its empirical formula were of little value. We are continuing our work on the chemistry of these phenolic bodies, the yield of which is so small as to necessitate the treatment of much larger quantities of material than those we have employed up to the present.

Incidentally, we have devised a simple test which enables one to distinguish between pure ginger essences, extracts, or oleo-resins, and those which for the purpose of flavouring, or for the making of mineral waters, have been "fortified" by the addition of capsicum. The method consists in digesting, say, 10 C.c. of the tincture or essence on a water-bath with a small quantity of caustic alkali for fifteen minutes; the alcohol is then evaporated off, the residue made faintly acid with HCl, the whole transferred to a test tube and shaken up with 5 Cc. ether, with which the dish has been previously rinsed. The ethereal solution is then tasted, when, in the case of pure ginger preparations, the pungency will be found to have entirely disappeared, while if capsicum is present the pungent biting taste is at once recognized. It is even found possible by means of this test to discriminate between preparations containing 1 and 3 parts respectively of capsicum in 100 parts of ginger.

Experimental Details.

A.—In this experiment, 14 lb. of Jamaica ginger in coarse powder were exhausted in a copper Soxhlet apparatus with boiling re-distilled methylated spirit, 92 per cent. strength (free from mineral oil). After distilling off the alcohol the separated oleo-resin was decanted from water, dried on a water bath in an evaporating basin, and weighed; the yield of total extractive was 302 Gm. (=5·7 per cent.). This was dissolved in ether, and the solution washed successively with:—

(*a*) Water, which removed a little colouring and gummy matter.

(*b*) Sodium carbonate solution (5 per cent.); this removed much dark brown highly-coloured resin.

(*c*) Caustic soda solution (5 per cent.) in order to dissolve out the phenolic bodies. This phenolic solution was then washed repeatedly with small quantities of ether to remove inert matter. A considerable time elapsed before this treatment was finally completed, with the result that on acidifying with HCl the

separated oil was found to possess very little pungency. The process was, therefore, considerably modified in the subsequent experiments.

B.—200 ounces of Jamaica ginger in No. 20 powder were exhausted by *cold* percolation with re-distilled S.V.M. It may be noted that this degree of fineness seemed very suitable for percolation, the powder being previously moistened with 5 oz. of alcohol to every 16 oz. of powder. Practically all the pungency and aroma were extracted when twice its volume of alcohol had passed through, making a 1 in 2 tincture.

The alcohol was recovered on a water-bath, the resulting oleo-resin dissolved in 80 per cent. alcohol, and the solution shaken out with petroleum ether in successive portions; the latter removed a large quantity (equal to 1½ per cent. of the total weight of ginger) of an almost black oily liquid, which was quite devoid of pungency, but contained fatty oil with some volatile oil. The petroleum solution was washed repeatedly with 80 per cent. alcohol till no more pungency was removed, the united alcoholic washings being finally washed with a little petroleum ether to remove last traces of oil. The alcohol was then recovered, the residue taken up with ether, and the ethereal solution shaken with Na_2CO_3 (5 per cent. solution) till the latter ceased to extract acid resin and colouring matter. The ethereal solution was then shaken out with 5 per cent. NaOH solution, added in small successive portions until the last washings were almost colourless and devoid of pungency. The united alkaline washings were washed with ether and finally acidified with HCl, the whole process being conducted as rapidly as possible. In spite of this, on acidification it was found that a certain amount of inert brownish flocculent matter separated with the dark oily phenolic bodies; the total weight of the latter after separation and evaporation was 58 Gm. (=1·0 per cent.). This crude phenol (which was intensely pungent) was then purified by fractional precipitation with petroleum ether from its solution in anhydrous ether, the first fractions being very black and nearly solid, and the later ones paler and more oily in character. Even after this purification the phenol evidently contained some impurity, for on dissolving in 70 per cent. alcohol and adding neutral lead acetate a considerable brown precipitate of lead salt was formed, which on washing was found devoid of pungency. The treatment with lead acetate was, therefore, continued till no more precipitate was formed;

after removal and washing of the lead salt the alcohol was re-recovered from the filtrate, the phenol dissolved in ether, and excess of lead washed out with very dilute acetic acid.

The effect of animal charcoal was tried in order to obtain a more colourless product, but without effect. Finally, 20 Gm. of a pale reddish-coloured semi-solid oil were obtained, which was then subjected to distillation *in vacuo*, as previously described, but the accompanying decomposition which took place showed that it was still impure "gingerol." It was therefore treated with hot petroleum ether, and the residue left after recovering the solvent again distilled *in vacuo*, when no decomposition was observed.

An attempt was made to prepare a benzoyl derivative; for this purpose a small quantity was dissolved in sufficient caustic soda solution, and benzoyl chloride added in slight excess; a reaction took place with evolution of heat. The separated oil was washed and exposed in a desiccator over caustic potash, but up to the present shows no signs of crystallizing. This oil possessed no pungency whatever, and we failed to regenerate an active phenol from it.

C.—In a third experiment 7 lb. of Cochin ginger were exhausted as in B; it was found possible to shorten the process of purification very considerably. The alcohol being recovered, the residual oleo-resin was taken up with 70 per cent. alcohol, the solution shaken with petroleum ether as before, to remove oil, and then treated with alcoholic neutral lead acetate, which gave a voluminous brown precipitate; this was filtered off with the aid of a pump, washed, and excess of lead removed in the filtrate by addition of sodium sulphate; the alcohol was recovered, the residue taken up with ether, the ethereal solution treated with Na_2CO_3 as before, and finally evaporated. In this experiment treatment with caustic alkali was omitted, as it appeared to cause some decomposition; on the other hand, the final product, though paler in colour, was perhaps not quite so free from non-phenolic bodies of a neutral or oily character. It was then boiled under a reflux condenser with successive portions of petroleum ether, the latter yielding a very pale oil; on evaporation finally, the latter was washed with a little cold petroleum ether, in which the gingerol is only sparingly soluble, in order to remove any adherent oily matter, and distilled under reduced pressure.

In conclusion, our thanks are due to Professor R. B. Wild for

his permission to conduct the investigation, which was carried out in the pharmaceutical laboratories of the University of Manchester.

Dr. JOWETT recommended the investigators to keep an open mind in regard to the homogeneity of gingerol. In the case of cannabinol, it was found that on regeneration it was free from activity. The method used was distillation under a very high vacuum under 1 mm. which he thought might be tried by the investigators. The vacuum was obtained by the use of liquid air, which could probably be obtained in Manchester.

Mr. GRIER, in reply, said that the inactivity of a substance on regeneration was not unexpected. There would be no difficulty in obtaining liquid air, as a factory had been established in the University. The ginger principle had not been isolated sufficiently pure or in large enough quantity to conduct many experiments.

THE OFFICINAL TESTING OF DRUGS AND CHEMICALS.

BY J. P. GILMOUR.

There have been divers so-called definitions of the status and scope of the British Pharmacopœia We owe what is probably the least exceptionable formula to Mr. J. R. Hill, according to whom the B.P. ought simply to fulfil the function of a standard for the guidance of prescriber and dispenser. Amplified, this means that the parties concerned are instructed by the B.P. as to criteria of the genuineness, strength, etc., of the natural and manufactured products and their preparations, which it makes official. In this respect it is absolutely binding on the physician who prescribes its preparations and the pharmacist who dispenses them ; but there is no imperative obligation on the part of the latter to adhere unconditionally to pharmacopœial processes. It is sufficient, both legally and morally, *pace* the hypothetical Tinct. Opii *omissus*, that the finished product should respond to B.P. tests. Indeed, by the logical implication of the judgment in a recent case—Robertson, for the Leith Sanitary Department, *v.* Duncan and Flockhart—the manufacturer of a B.P. preparation may be entitled to go further and employ a non-official solvent or preservative, provided he can demonstrate that it serves the purpose as well as or better than that officially ordered. If the preceding considerations be systematically applied in officinal practice, the prevailing view of the character

and uses of the B.P. ought to be considerably simplified, and an impetus given to the utilization of the ample resources which the compilers have placed at the disposal of the qualified persons, whom it concerns, for the identification and qualitative and quantitative estimation of official drugs and chemicals. It is doubtful whether many retail pharmacists are fully aware of the simplicity, feasibleness, and practical value of the B.P. instructions in this connexion, and it is still more problematical whether the conscience of the pharmacist is always as sensitive as it should be to the solemn moral obligation that rests upon him or her to be satisfied personally of the genuineness, activity, etc., of all officinal drugs and chemicals, official and non-official. It is not that adulteration is more rife than formerly. On the contrary, in consequence of the growth and development of a higher code of commercial morality, combined with increased stringency in the enforcement of the Food and Drugs Acts, gross sophistication has become infrequent. But neither this amelioration nor any system of guaranty nor warranty, however efficient, can absolve the prescriber-cum-dispenser, or the dispenser *per se*, from the responsibility of personally authenticating the materials which he handles, if only on the somewhat mean prudential principle of self-preservation

All of us can recall numerous cases in which failure to take the simple precaution of identifying a drug or its preparation when added to stock, or transferred from a store to a service container, has led to serious or fatal poisoning. There is no other explanation for the lamentable frequency with which strychnine has been dispensed for santonin, although in these cases the initial blunder is aggravated by the criminal ineptitude of the person who weighs out and mixes strychnine with other ingredients in a powder without detecting its difference from santonin. The practical value of identification tests is surely obvious, and yet there would seem to be but scanty recognition of it. In my own experience, or within my personal knowledge, preliminary tests have had such detective results such as these :—Tinct. Aconiti sent for Tinct. Cimicufugae, Quinin. Sulph. mixed with caffeine, Potass. Iodid. mixed with bromide, Ext. Nucis Vom. Liq. sent for Ext. Cascara Sag. Liq., plaster of Paris sent in a calcined magnesia pottle, and Hydrarg. Perchlor. put in a bottle for calomel.

Many retail pharmacists are deterred from engaging in the systematic testing of drugs and chemicals for two reasons. The

first being that such work lies beyond the reach of any one save a professional analytical chemist, and the second, that even if this disability were overcome, the labour is too troublesome and costly to be compatible with ordinary shop business. The former misconception is traceable largely to the fact that while the Pharmaceutical Society's present qualifying examination meets and even exceeds statutory requirements, it is nevertheless insufficient as a measure of the candidate's equipment for exact scientific work. At the same time, with some addition of intelligence, it is adequate for the analytical knowledge and skill demanded for B.P. testing and pharmaceutical testing generally. The second inhibitory cause is rendered inoperative by a reference to the B.P. Appendix giving the list of reagents, test-solutions, etc. Most of the materials are included in the regular stock of every pharmacist in business, and the rest are, for the most part, cheap and easily procurable. The test and volumetric solutions can be readily prepared and keep well, and the following list of apparatus serves for an approximately complete outfit:—Chemical balance and set of gramme weights; microscope, 50 to 300 or 500 diameters; burette and stand, nitrometer, set of beakers, stoppered litre flask, set of flasks, set of evaporating basins, test tubes, glass tubing, two separators, copper water-bath with rings, chemical thermometer, −20° to 360°C., specific gravity bottle or pyknometer, fractionating flask, cubic centimetre measures and pipettes, platinum foil and wire. As extras for the scientific sybarite who can pay for luxuries there may be suggested a supplementary list—viz.:—Thermostat, glass or metal aspirator, range of hydrometers, polarimeter.

Many of the articles in the first of the foregoing lists are to be found in every well-appointed pharmacy, the microscope relegated too often to a corner, being usually a relic of student days. In any case, the total initial outlay ought not to exceed £10, and a few shillings per annum will cover breakages. If the work of testing is done methodically, it takes surprisingly little time. While there is an inevitable tendency on the part of the compilers of the B.P. to add to the number of standardized substances and preparations, the assay of which on the small scale is undoubtedly laborious, and occasionally difficult, the authorities still avoid for the most part elaborate gravimetric estimations, and such of them as are given, e.g., the determination of the percentage of ash, are quite negotiable, even by an amateur. The gain from systematic official testing, as has been indicated,

is manifold. It must suffice here to name two of the principal advantages. First, the dispenser or vendor is assured from direct experimental knowledge of the identity, purity and activity of the commodities taken into stock, and, consequently, that he is getting what he has ordered and is to pay for, or has prepared and has to vouch for; moreover he can dispense or vend the goods with the clear confidence and conscience that positive knowledge alone imparts. Secondly, he attains the personal satisfaction of reducing to fruitful practice the otherwise largely disused or undeveloped technical training which he underwent for the qualifying examination, and so maintains and accelerates in himself that movement of the intellect which, above all things, gives life, zest and significance. Such practice will also equip the pharmacist more efficiently for the duty too often neglected, or but perfunctorily performed, of giving his assistants and apprentices practical instruction in physical and chemical testing as applied to materia medica. Finally, it will have the ulterior effect of raising the status of the pharmacist to that professional level to which the average pharmacist of the present aspires rather than ascends.

For the purpose of illustrating and enforcing the doctrine of this paper, I have gone over my laboratory memoranda for a period of seventeen years, and present the results in the subjoined tabulated form and appended notes. These gleanings are meagre compared with the rich sheaves of the harvest field which you are accustomed to receive from the robust and eke robustious scientific reaper; but I venture to submit them as vindicating the thesis implied in the title of this contribution. In every case, unless otherwise specified, B.P. tests exclusively were applied. The legal, if not the scientific position is that, as regards pharmacopœial articles, they are to be accepted as of B.P. standard if they conform to B.P. tests a principle very clearly reaffirmed in the Brompton cod-liver oil prosecutions. It comes to be a nice question whether, when a B.P. test is demonstrated to be inadequate or misleading, e.g., the quantitative tests for the presence of minute traces of As and Pb in B.P. compounds, a substance which conforms to the invalidated test ought therefore to be exempt from any new food and drug standard set up by a local authority. Of one thing there can be no doubt: Whatever may be the analytical value of the B.P. test, if the substance or preparation responds to it, that article is legally describable and defensible as of B.P. standard.

TABLE I.—OFFICIAL DRUGS AND CHEMICALS.

Name of Drug, etc.	No. of Samples Examined.	B.P.	Not B.P.	Average Deficiency of Pure Substance per cent.	Remarks.
Ac. Acetic. Fort	30	24	6	3·12	Non-B.P samples said to be German.
Ac. Acetic. Glaciale	10	8	2	6·45	
Ac. Benzoic	6	6	—	—	Cl in one sample indicated synthesis from toluene.
Ac. Hydrobrom. Dil.	12	12	—	—	
Ac. Hydrochlor. Ft.	9	9	—	—	Trace of As in all. Gutzeit's test.
Ac. Hydrocyan. Dil.	34	21	13	12·5	
Ac. Nitric Fort.	14	6	8	4·28	U.S.P. standard, 68 per cent.
Ac. Oleic	5	3	2	—	Palmitic and stearic acids present.
Ac. Salicylic	13	13	—	—	Samples examined 1901 indicated cresols.
Ac. Sulphuric Ft.	15	11	4	—	Traces of As.
Ac. Sulphurosum	8	2	6	21·87	Hardly ever full strength unless fresh.
Adeps.	50	48	2	—	Cottonseed oil present. Becchi and Bevan's tests.
Amylum	24	20	4	—	Potato starch present.
Aq. Destillata	48	7	41	—	*Vide ut infra.*
Benzoinumi (Siam)	6	—	6	—	10 per cent. insoluble residue.
Bismuthi Salicylat.	8	—	8	—	All contained free Acid. Salicylic.
Ol. Cajuputi	8	7	1	—	Cu present.
Liq. Calcis	100	76	24	15·3	*Vide ut infra.*
Calx Sulphurata	12	8	4	—	Deficient in sulphide.
Cascar. Sag. Ext. Liq.	73	61	12	—	*Vide ut infra.*
Lin. Camphoræ	86	80	6	30	*Vide ut infra.*
Catechu.	7	7	—	—	No sample completely soluble in water.
Cera Alba	18	9	9	—	Paraffin wax present.
Cetaceum	10	10	—	—	Traces of stearic acid.
Colocynth. Pulp.	5	3	2	—	Largely admixed with starch.
Copaiba.	25	20	5	—	Gave reaction for gurjun balsam.
Creosotum	17	17	—	—	
Creta Præparata	12	8	4	—	Silica and sulphates present.
Crocus	20	19	1	—	Adulterated with 33 per cent. $BaSO_4$.
Ol. Eucalypti	27	25	2	—	Excess phellandrene.
Ferri Arsenas	10	—	10	40	*Vide ut infra.*
Syr. Ferri Iodid.	37	37	—	—	
Ferri Phosphas.	13	—	13	23·42	*Vide ut infra.*
Ferrum Redactum	9	1	8	—	More than traces of As. *Vide ut infra.*
Glycerinum.	25	15	10	—	Ten samples examined before 1900. As present. ***Vide ut infra.***
Hydrargyri Oleas	11	—	11	—	Considerable quantity of chloride present.
Liq. Hydrogen. Peroxid.	120	14	106	—	*Vide ut infra.*
Gossypium	18	15	3	—	Not purified from fatty matter.
Hydrarg. Perchlor.	15	15	—	—	Several samples contained basic salt.

Hydrarg. c. Creta	8	6	2	—	HgO present.
Jalapa	12	12	—	—	
Juniperi Oleum	4	4	—	—	
Lavandulæ Oleum	10	10	—	—	
Linum Contusum	27	22	5	—	Deficient in oil 33 per cent.
Liq. Magnesii Carb.	96	94	2	12·5	*Vide ut infra.*
Ol. Morrhuæ	150	150	—	—	
Ol. Olivæ	75	73	2	—	*Vide ut infra.*
Paraffinum Durum.	13	11	2	—	M.p. 59°C.
Paraffinum Liquid.	9	5	4	—	Organic matter and acid.
Paraffinum Molle	17	17	—	—	Some samples have strong paraffin oil odour.
Paraldehydum	13	13	—	—	
Phenazonum	20	20	—	—	Several samples had offensive animal odour.
Potass. Citras	18	18	—	—	Rarely neutral. Invariably acid or alkaline.
Potass. Iodid.	35	35	—	—	
Ol. Ricini	59	59	—	—	
Saccharum Lactis.	14	14	—	—	Several samples seemed to exceed B.P. limit for lactic acid.
Saccharum Purificatum	114	114	—	—	*Vide ut infra.*
Sapo Mollis	13	13	—	—	Alcohol insoluble residue tends to exceed 3 p.c. with most samples.
Scammon. Resin.	9	9	—	—	Some samples not entirely soluble in ether.
Sodæ Chlorinat. Liq.	10	2	8	20 per cent.	
Sodii Bicarb.	87	87	—	—	None withstood $HgCl_2$ test.
Sodii Carb.	19	19	—	—	
Sodii Chlorid.	14	14	—	—	Traces of potassium and magnesium salts.
Sodii Nitris	7	7	—	—	
Sodii Phosphas	5	5	—	—	Traces of sulphates and chlorides.
Sodii Salicylas	115	115	—	—	*Vide ut infra.*
Sodii Sulphas	34	34	—	—	Occasionally traces of chloride.
Sodii Sulphis	19	19	—	—	
Soda Tartarata	94	94	—	—	
Spt. Æth. Nit.	58	54	4	60	*Vide ut infra.*
Spt. Vini Rect.	45	45	—	—	Some samples contained appreciable quantity of aldehyde.
Sulphur Precipit.	24	24	—	—	
Sulphur Sublim.	76	76	—	—	*Vide ut infra.*
Terebinth. Oleum	38	38	—	—	*Vide ut infra.*
Theobromatis Oleum	19	10	9	—	Average m.p. of 9 samples higher than B.P., and other fats present.
Tragacanth.	14	14	—	—	
Zinci Carbonas	18	18	—	—	
Zinci Chloridum	9	9	—	—	Invariably basic.
Zinci Oxidum	25	25	—	—	Confirmed Squire's experience that not entirely soluble in solution of ammonia.
Zinci Sulphas	29	29	—	—	
Total Number of Articles, 80	2,445	2,074	371		

It is highly satisfactory to find from an analysis of these figures that only 11·08 per cent. of the total number of samples examined failed to satisfy B.P. requirements. There is no need to apportion the responsibility for this comparatively trifling deficiency. It is divisible between manufacturer, wholesaler, and retailer. The main concern is to obviate its perpetuation by discovering and removing the causes of the inferiority.

Aqua Destillata.—Unless the pharmacist prepares this for himself there is great, if not insuperable, difficulty in procuring it pure. In nine cases out of ten the sample has an odour, yields a residue which is quite visible, and often exceeds the U.S.P. limit of 0·075 Gm. per 1,000 C.c., and fails to give clear solutions with soluble silver salts. The writer has been supplied with liquids purporting to be distilled water which gave an acid or alkaline reaction, yielded a copious precipitate with silver nitrate, or contained a plentiful growth of fungi. Assuming that all these specimens were bona fide *Aqua Destillata* to begin with, the contaminations must have been due to storage in dirty containers, omission to rinse out comparatively clean containers with hot distilled water, etc. To ensure effective preservation of distilled water it would be necessary after the prescribed rinsing to fill the vessel with sterilized air, and also to supply this whenever water is withdrawn from the vessel.

Liq. Calcis—Most commercial samples give more than traces of chlorides. It is significant that the U.S.P. omits any test for these. In any case the presence of a fractional percentage of chlorides is not likely to be detrimental. The most satisfactory product is that prepared with calcium hydroxide derived from marble.

Ext. Cascara Sagrad. Liq.—The non.-B.P. samples contained glycerin. It is not a heinous offence to preserve this liquid extract with glycerin. On the contrary, glycerin is superior to alcohol, which, although usually present in more than B.P. quantity, may, under certain conditions of storage, fail to prevent fermentation, as it certainly fails to avert deposition unless in a batch that has been long matured on the manufacturer's premises. The objection is not to the glycerin, but to the attempt to pass off a glycerinated liquid extract of cascara as B.P. The samples examined varied extraordinarily as to the percentage of extractive. One sample yielded as much as 30 per cent., but there were some as low as 18 per cent. As is well known, however, the activity of the preparations does not necessarily depend on the amount of extractive.

Lin. Camphoræ.—The non-B.P. samples were supplied by wholesalers to public institutions. It is perhaps unfortunate that the B.P. gives no specific instructions as to the precise mode of preparation of the liniment, but, although it may be very rash on their part, the compilers have occasionally left something to the judgment and resource of the compounder. Of course, if the compounder is destitute of both, he may find himself before the magistrate. The liniment, if not prepared with boiling oil in an open vessel, cannot lose much camphor, and the talk of volatilization of camphor in loosely stoppered bottles is merely special pleading, which does not even make a good defence. The writer has satisfied himself by repeated estimations of Lin. Camphoræ stored under diversified test conditions, that loss of camphor by volatilization at ordinary temperatures is trifling. The most essential thing is to put in all the camphor.

Ferrous Arsenate.—The mode of preparing this needs improvement. Some of the commercial samples give absolutely no reaction for ferrous salt. Ferric arsenate is supposed to be quite inert, according to the theory of administering ferric hydroxide for arsenical poisoning.

Ferrous Phosphate.—Always much below the B.P. percentage, and a very inconvenient form for dispensing. It might be an advantage to adopt the Ferri Phosphas Solubilis, U.S.P.

Ferrum Redactum.—At the time when there were several prosecutions on account of the presence of arsenic in this, attempts were made to procure an arsenic-free specimen. A number which were so certified failed to satisfy the Gutzeit test. The writer had to wait six weeks for a supply positively purged from the pervasive contamination. The next B.P. might advantageously specify a reasonable limit for arsenic.

Hydrargyri Oleas.—All commercial samples examined showed sodium chloride in considerable amount, due to insufficient washing of the oleate. The present process is clumsy, and the product variable in consistency and stability. Why not revert to the 1868 process, or adopt the U.S.P. modification?

Liq. Hydrogenii Peroxid.—It seems certain that average commercial samples, unless recent, never contain 10 volumes of oxygen. It would be better to follow the precedent set in the case of Spt. Æth. Nit., and allow a margin for deterioration, or prepare a stronger liquor.

Liq. Magnesii Carbonat.—Commercial samples average 7 grains of the official Magnes. Carb. to the ounce, and invariably

contain sulphate, but as it is notoriously difficult to eliminate sulphate, and a homœopathic quantity of sodium sulphate may possibly augment the feeble laxative action of the liquor, there seems to be no good reason why the B.P. direction should not be altered to read "nearly free from sulphate." As the writer has not found any deficiency in the amount of Magnes. Carb. in samples prepared by himself, even after prolonged keeping, the poorness of the commercial samples examined by him must be due to remissness in the process of production or to indifferent storing.

Ol. Olivæ.—One of the samples, which was largely adulterated with cottonseed oil, was said to be of Levantine origin, and was offered by a foreigner at a very low price.

Saccharum Purificatum.—The B.P. tests are not stringent enough. They ought to be devised to exclude all "faced" sugars, which play havoc with medicinal syrups. The U.S.P. stipulation that aqueous and alcoholic solutions should not deposit a sediment on prolonged standing meets the case.

Sodii Salicylas.—The B.P. does not require this salt to be "physiologically pure," although by fixing the limits of the melting-point of Ac. Salicylic it practically ensures the absence of cresols from the latter. Medical authorities are at variance as to the degree of toxicity of cresol-contaminated sodium salicylate, many of them attributing the gastric irritation, etc., to the action of the salt itself—a contention which is supported by the fact that patients taking the physiologically pure salt often manifest the so-called toxic symptoms. Cresol-containing samples of sodium salicylate are now of rare occurrence, although it is said that the salt for veterinary use is generally impure in this respect.

Spt. Æth. Nit.—Theoretically it might be better if this much-discussed preparation were superseded by Liq. Æthyl Nitritis, but medical practitioners insist that they get better results with the spirit, a circumstance which favours the doctrine that the therapeutical value of the preparation is not exclusively due to the ethyl nitrite. However, the pharmacist's present duty is to maintain the B.P. standard, and with reasonable precautions this can be effected.

Sulphur Sublim.—Squire states that commercial sublimed sulphur is always more or less acid, and that only "washed sulphur" fulfils the B.P. requirement as to freedom from acidity. The majority of the samples examined, as above were quite

neutral, and must therefore, if Squire be correct, have belonged to the "washed sulphur" group.

Terebinthinæ Oleum.—T. Dunlop and others have not found the glacial acetic acid test workable. They cannot get a perfect solution of 1 : 1. In my experience this residual insolubility is a conclusive proof of the impurity of the sample of turpentine. The official monograph expressly declares, "rectified if necessary." The test answers infallibly with any good rectified turpentine, but not with the ordinary commercial article, which is too often supplied for medicinal purposes.

This paper has reached such an unexpected length that the part dealing with unofficial drugs and chemicals, and the microscopic examination of powdered drugs, must be reserved for a future occasion.

Mr. Edmund White and the President referred to the laborious efforts of the author, and the former congratulated him on completing such a large number of experiments—considerably over 2,000; but that did not represent the amount of work involved.

NOTE ON THE KEEPING PROPERTIES OF INFUSION OF QUASSIA.

By Ernest Quant, F.C.S.

In preparing infusion of quassia at the dispensing counter it has frequently occurred to me that this infusion would probably keep better if prepared with boiling water, considering that it does not contain any appreciable amount of starchy matter liable to be extracted, as would be the case with the only other cold infusion of the Pharmacopœia—infusion of calumba—and in perusing the monograph on infusions in a modern textbook—I refer to "Pharmacopedia"—I find: "It has been stated that an infusion of quassia made with boiling water does not keep so well as a corresponding infusion made with cold water. This is a doubtful point, concerning which further definite experimental information is required." I therefore thought it might be worth while to carry out a few simple experiments which might help to solve this question. For my first experiment I made two infusions of pharmacopœial strength, employing cold distilled water in the one case and boiling distilled water in the other, infusing for fifteen minutes, according to official directions. Each infusion was afterwards divided

into two portions, one-half being strained through cotton wool, the remainder filtered through paper, and each portion was stored in two bottles, the one being full and the other partially filled, as shown by the following table:—

1	Cold infusion	Strained	Bottle full.
2	Cold infusion	Strained	Bottle half full.
3	Cold infusion	Filtered	Bottle full.
4	Cold infusion	Filtered	Bottle half full.
5	Hot infusion	Strained	Bottle full.
6	Hot infusion	Strained	Bottle half full.
7	Hot infusion	Filtered	Bottle full.
8	Hot infusion	Filtered	Bottle half full.

My observations from day to day on these specimens were as follows:—

First Day after Making.—A microscopical examination by the "hanging drop" method revealed motile bacteria in every specimen and in about equal numbers. No physical change.

Second Day.—Hot infusion showed no perceptible change in odour or colour.

Cold infusion smelt very slightly sour. Bacterial life present throughout, but appeared rather more vigorous in the cold than the hot infusions.

Third Day.—No noticeable change.

Fourth Day.—A few bubbles of gas appeared on the surface of the hot specimens; none on the cold infusions. Odour slightly stronger in the hot than the cold infusions.

Fifth Day.—Bubbles of gas increased in the hot infusions; none observable in the cold. Turbidity decidedly apparent in the hot infusions; no perceptible change in the cold specimens.

Sixth Day.—No further change.

Tenth Day.—Cold infusions (strained and filtered) showed a few bubbles in the full bottles; none in the half-filled bottles. Of the hot specimens the full bottles contained most bubbles.

The inference to be drawn from these observations is that a cold infusion is preferable to a corresponding infusion made with boiling water. To confirm these results, after an interval of eight months, I made another series of infusions, on this occasion using quassia chips from my own stock, the former specimens having been prepared from raspings obtained from another retail pharmacy. Two infusions were made:—(1) With cold distilled water; (2) with boiling distilled water.

From cultivations of these infusions on the following day on

agar incubated at 37°C., and gelatin at 16°C., the following results were obtained :—

Incubated.	Infusion.	Plate.	Number of Colonies Per C.c.	Note.
24 hours	Cold water .	Agar .	150	Colonies very small and white
24 hours	Cold water .	Gelatin .	None	—
24 hours	Boiling water	Agar .	250	Colonies larger, showing variation in colour
24 hours	Boiling water	Gelatin .	None	—

At the end of forty-eight hours the gelatin plates showed no distinct colonies, but much liquefied gelatin was produced, although nearly three times as much in volume from the hot infusion than from the cold infusion.

Having verified to my satisfaction the results which I had previously obtained, I proceeded to ascertain if the present method of infusion could be improved by some simple method. For this purpose a B.P. infusion was prepared, and, after straining through cotton wool, it was divided into two portions—the one reserved and bottled; the remaining portion was brought to the boiling point, allowed to cool, and then bottled. Another infusion was made with diluted chloroform water 1 : 1,000.

These infusions were then plated out in the same manner as those already recorded.

Incubated	Infusion.	Plate	Number of Colonies per C.c
24 hours	Cold water	Agar .	200–250
24 hours	Cold water . . .	Gelatin .	None
24 hours	Cold water, afterwards boiled	Agar .	60
24 hours	Cold water, afterwards boiled	Gelatin	None
24 hours	Diluted chloroform water, 1 : 1,000 . .	Agar .	200–250
24 hours	Diluted chloroform water, 1 : 1,000 . .	Gelatin .	None

As in the former instances, the gelatin plates revealed no very distinctive colonies. Liquefaction of the gelatin ocurred in each case, though perhaps with not so much cloudiness in the case of the cold infusion, which was subsequently boiled.

Affter a period of eight days I find the cold infusion which was boiled to be perfectly clear in colour, free from odour, and the taste equal to that of a freshly-made infusion. The portion of the same infusion not boiled is distinctly cloudy in appearance, and an odour is perceptible.

From the results of these observations I am of opinion that the present cold infusion of quassia keeps better than one made with boiling water, but that the present infusion would be improved in its keeping properties if to the present official directions were added instructions "to boil for a few minutes and allow to cool."

Mr. Rutherford Hill said the suggestion of boiling infusion was not exactly new, as nearly forty years ago Mr. Stephenson, of Edinburgh, had suggested that the infusion should be placed in a bottle immersed in a water-bath, heated to boiling, and then covered with skin. It was practically a process of sterilization. The same method was suggested by Mr. Currie at a recent meeting of the Pharmaceutical Society in Edinburgh. Freshly made infusion should be placed in a bottle plugged with cotton wool, heated to boiling and allowed to cool.

Mr. G. Claridge Druce said he had been in a district in Scotland which was troubled with midges. Lady Godfrey Clarke suggested to him that the best thing for midges was quassia, the method being to boil in water, not to infuse it. It was applied direct to the face.

Dr. McWalter agreed with Mr. Hill that quassia could be kept sterile by leaving cotton wool in the neck of a flask of the infusion.

Mr. Quant, in reply to Mr. Hill, said by the method alluded to the infusion would not remain sterile.

THE DETERMINATION OF FERROUS CARBONATE.

By Philip H. Crewe.

Part I.—The Determination of Ferrous Carbonate in Saccharated Ferrous Carbonate.

Whilst engaged in assaying some samples of saccharated carbonate of iron, it was observed that inconcordant results were obtained by following the directions given in the British Pharmacopœia. The B.P., 1898, states that the ferrous carbonate is to be dissolved in an excess of warm concentrated

phosphoric acid and titrated with a volumetric solution of potassium bichromate, and as no criticism of this method has appeared since the publication of the B.P., experiments lasting over several weeks were undertaken, with the object of discovering the cause of the inaccuracy, and of devising a suitable method for the assay of this compound.

After the conclusion of these experiments a note in Squire's "Companion to the B.P." drew the writer's attention to papers by G. Coull (*P.J.*, 1891–2, p. 805) and J. F. Liverseege (*C. and D.*, 1897, 2, p. 492). Coull points out that phosphoric acid, cold or hot, and hydrochloric acid, cold, have no reducing action on ferric salts in the presence of sugar, but Liverseege, by a number of tests, shows that accurate results can only be obtained when cold phosphoric acid is employed.

B. S. Proctor ("Manual of Pharmaceutical Testing," 1891 and 1899) states that he finds no practical difference whether phosphoric, sulphuric, or hydrochloric acid is used, so long as heat is not applied, and the contact of the acid is not prolonged.

T. A. Ellwood (*P.J.*, 1891–2, p. 394) does not quite agree with Proctor's statement that it is immaterial which acid is employed, and finds discrepancies amounting to 2 per cent. by using the different acids. W. H. Howie, as long ago as 1875 (*P.J.*, December 18) recommended the use of phosphoric acid, and showed that 2 grammes of saccharated iron carbonate, when dissolved in hydrochloric acid and diluted with water, required 2 mils. more standard bichromate than when the solvent was phosphoric acid.

H. R. Hoyles (*P.J.*, 1884–5, p. 1,058) states that cane sugar undergoes inversion when treated with an acid, and that the excess of standard bichromate required is due to the reducing action of the invert sugar. Hoyles' experiments were made with a mixture of equal parts of crystallized ferrous ammonium sulphate and pure cane sugar. A weighed amount was dissolved in cold sulphuric acid (1–4 by volume) and titrated with standard bichromate. The result was 8 per cent. higher than that obtained by employing phosphoric acid.

No specific directions are given in the B.P. 1885 for the use of *warm* phosphoric acid, and notwithstanding the published statements to the effect that heat should not be used, the 1898 edition directs that warm phosphoric acid is to be employed. As before stated, no criticisms of this assay could be traced since the last issue of the B.P., and no apology need, therefore, be

made for the publication of the following experiments, which will re-discover an error that has evidently been forgotten.

The root of the difficulty is that cane sugar present in saccharated iron carbonate, undergoes inversion into levulose and dextrose when treated with an acid, and, as will be shown, the presence of a trace of invert sugar seriously affects the accuracy of the test. It is important, therefore, that the conditions must be such that none, or only a very small amount, of cane sugar is inverted during the solution of the ferrous carbonate. The tests given below show the action of acids of different strength on cane sugar; the amount of Fehling's solution reduced being proportional to the rapidity of the inversion.

No.	Acid.	Strength (by weight).	Time.	Temperature.	Amount of Reduction of Fehling's.
1	Phosphoric	B.P. Conc. 66%	5 min.	16° C.	Slight.
2	Phosphoric	B.P. Conc. 66%	10 min.	16° C.	Decided.
3	Phosphoric	50%	10 min.	16° C.	None.
4	Phosphoric	50%	15 min.	16° C.	Slight.
5	Phosphoric	50%	5 min.	30° C.	Decided.
6	Phosphoric	50%	30 min.	0° C.	Very slight.
7	Sulphuric	20%	5 min.	16° C.	Slight.
8	Sulphuric	10%	10 min.	16° C.	Slight.
9	Hydrochloric	10%	10 min.	16° C.	Decided.

It will be seen from the above tests that sulphuric and hydrochloric acids act on cane sugar much quicker than does a stronger solution of phosphoric acid. The difference is quantitatively shown in the following results. A solution of ferrous sulphate was taken, and the volume of decinormal potassium bichromate required by 20 mils. was accurately determined. In each test 0·5 gramme of cane sugar was treated with 15 mils. of the acid for the length of time stated below. The iron solution was then added, and the solution titrated with standard bichromate. The excess of reagent required is a measure of the amount of sugar inverted.

No.	Ferrous Sulphate Solution.	Acid.	Strength (by weight).	Time.	Temp.	Amount of N/10 Bichromate.	Excess of N/10 Bichromate.
Blank	20 mils	Phosphoric	50%	—	16° C.	23·85 mils	—
10	20 mils	Phosphoric	50%	20 min.	16° C.	23·90 mils	0·05 mil
11	20 mils	Phosphoric	50%	1 min.	30° C.	24·90 mils	1·05 mil
12	20 mils	Sulphuric	25%	4 min.	16° C.	24·05 mils	0·20 mil
13	20 mils	Sulphuric	25%	15 min.	16° C.	24·20 mils	0·35 mil

A sample of saccharated carbonate of iron was tested in a similar manner to the above. For the sake of simplicity the results, which are tabulated below, have been calculated to 1 gramme of the iron compound.

No.	Ferri Carb. Sacc.	Acid.	Strength (by weight).	Time	Temp.	Amount of N/10 Bichromate	Ferrous Carbonate.
14	1 Gm.	Phosphoric	50%	20 min.	16° C.	29·02 mils	33·6%
15	1 Gm.	Phosphoric	50%	30 min.	16° C.	29·02 mils	33·6%
16	1 Gm.	Phosphoric	50%	1 min.	50° C.	30·20 mils	35·0%
17	1 Gm.	Sulphuric	25%	10 min.	16° C.	29·35 mils	34·0%
18	1 Gm.	Sulphuric	10%	20 min.	16° C.	29·35 mils	34·0%

It has been shown in the above experiments that cane sugar itself does not appreciably increase the amount of bichromate, and the influence of invert sugar was next determined. Twenty grammes of cane sugar was inverted by heating for five minutes at 70°C. with dilute sulphuric acid, and the solution diluted to 1,000 mils. A standardized solution of ferrous sulphate was again employed, and sulphuric acid was used in each test.

No	Ferrous Sulphate Solution	Invert Sugar Solution.	Time	Temp	Amount of N/10 Bichromate	Excess of N/10 Bichromate
Blank	10 mils	—	—	16° C	14·80 mils	—
19	10 mils	10 mils	added quickly	16° C	17·00 mils	2·20 mils
20	10 mils	10 mils	5 min.	16° C	17·25 mils	2·45 mils
21	10 mils	10 mils	10 min.	16° C.	17·65 mils	2·85 mils

These results show how great the influence of invert sugar is on the amount of bichromate required; the presence of a decigram (in No. 19) causing an increase of 2·20 mils. of the reagent, and this excess calculated on 1 gramme of saccharated iron carbonate would give a result of 2·5 per cent. $FeCO_3$ too high. The difference between experiments Nos. 19, 20, 21 shows that the length of time taken in adding the bichromate influences the amount required. It is evident that the ferric salt is attacked when in the nascent state, but a qualitative test proved that ferric salts are reduced by invert sugar, although very much slower than when freshly oxidized.

Levulose is a much more powerful reducing agent of iron salts than dextrose is, and the difference is demonstrated in the following experiments, made by adding varying amounts of

either sugar to a standardized solution of ferrous sulphate and determining the excess of potassium bichromate required.

No.	Ferrous Sulphate Solution.	Sugar.	Temp.	Amount of N/10 Bichromate.	Excess of N/10 Bichromate.
Blank	10 mils	—	16° C.	22·60 mils	—
		Levulose.			
22	10 mils	0·005 Gm.	16° C.	22·75 mils	0·15 mil
23	10 mils	0·015 Gm.	16° C.	23·05 mils	0·45 mil
24	10 mils	0·075 Gm.	16° C.	24·65 mils	2·05 mils
25	10 mils	0·250 Gm.	16° C.	27·70 mils	5·10 mils
		Dextrose.			
26	10 mils	0·025 Gm.	16° C.	22·60 mils	0 mil
27	10 mils	0·075 Gm.	16° C.	22·70 mils	0·10 mil
28	10 mils	0·500 Gm.	16° C.	23·55 mils	0·95 mil

The following method is recommended by the writer for the assay of saccharated carbonate of iron.

Weigh out about 1 gramme of the saccharated ferrous carbonate. Add to this 10 mils. of cold 50 per cent. phosphoric acid (equal volumes of B.P. concentrated and water). Allow to stand for fifteen minutes, stirring at intervals. Dilute to about 70 mils. with water, and titrate with decinormal potassium bichromate. Each mil. of the reagent is equivalent to 0·01159 gramme of ferrous carbonate (oxygen = 16·00).

Part II.—The Determination of Ferrous Carbonate in Pilula Ferri.

The effect of warm acid on cane sugar was considered in Part I of this paper, and it was shown that iron in the ferrous condition could not be determined accurately by titrating with bichromate of potassium in the presence of invert sugar. At the same time results were obtained which proved that cane sugar is only slowly attacked by cold phosphoric acid, and that no inversion takes place in the time required for a test. Pilula Ferri made by the B.P. formula contains about 20 per cent. of cane sugar, and it is therefore important that no heat should be used in dissolving the ferrous carbonate.

The Pharmacopœia states that each pill should contain about 1 grain of ferrous carbonate, but as no directions for the assay are given, it is left for the chemist to devise his own method, or

to follow the recommendations of others. F. X. Moerk (*P.J.*, 1903, 2, p. 307) shows that it is impossible to accurately determine the ferrous carbonate, on account of the reducing action of the organic excipient on the standard bichromate employed for the titration. This conclusion is based on experiments made in the following manner :—

Three pills (or 1 Gm. of the pill mass) were heated with 10 mils. of dilute sulphuric acid and 50 mils. of water in a current of carbon dioxide to prevent oxidation of the iron. When complete disintegration had resulted, the solution was cooled, and titrated with standard bichromate in the usual way.

It will be observed that heat was applied in these tests, and it is therefore probable that the presence of invert sugar partially explains the high results obtained by Moerk.

J. H. Gough (*P.J.*, 1903, 2, p. 880) in a later paper recommends the following method for the assay of Pilula Ferri :—Remove the coating from the pills, cut them into small pieces and weigh out 1 Gm. Place in a flask with 5 mils. of phosphoric acid dilute, B.P., and 10 mils. of water. Heat quickly to 150°F., shake until dissolved, dilute the cooled solution to 100 mils., and titrate 50 mils. with standard bichromate.

As in the above case, heat is again recommended, and a blank test made by heating 2 grains of cane sugar (the amount contained in two pills) with 5 mils. of dilute phosphoric acid and 10 mils. of water to 150°F. for five minutes showed an appreciable amount of inversion with Fehling's test. It has already been shown that the error due to cane sugar itself is only slight, so that the above error can be overcome by dissolving in cold phosphoric acid and thus preventing the formation of invert sugar.

In addition to cane sugar, Pilula Ferri, made by the official formula, contains acacia 10 per cent., tragacanth 3 per cent., and glycerin 2 per cent., and, as will be seen from the following experiments, all these excipients influence the amount of bichromate required.

A solution of ferrous sulphate was titrated with standard bichromate, and to a measured amount was added a quantity of acacia and tragacanth equivalent to that in four pills, and the excess of bichromate required was determined.

In another test three times this amount of the mixed gums was added, and other experiments were made using similar proportions of glycerin.

No.	Ferrous Sulphate Solution.	Excipient.	Amount of N/10 Bichromate.	Excess of N/10 Bichromate.
Blank	10 mils	—	14·80 mils	—
29	10 mils	Acacia, 2 grains; Tragacanth, 0·75 grain	14·95 mils	0·15 mil
30	10 mils	Acacia, 6 grains; Tragacanth, 2·2 grains	15·10 mils	0·30 mil
31	10 mils	glycerin, 0·4 grain	15·30 mils	0·50 mil
32	10 mils	glycerin, 12 grains	15·90 mils	1·10 mil

The error due to the action of the acacia and tragacanth on the standard bichromate amounts to only 0·007 grain of $FeCO_3$ per 5-grain pill, but the excess of reagent required by the glycerin calculates to 0·022 grain of $FeCO_3$ per 5-grain pill. The total error, therefore, due to the effect of organic matter amounts to about 0·03 grain of $FeCO_3$ per 5-grain pill; or 0·6 per cent. of ferrous carbonate.

Many modifications of the B.P. formula have been suggested, the object being to produce a pill which will retain the iron permanently in the ferrous state.

E. W. Lucas and H. B. Stevens (*P.J.*, 1903, 2, p. 400), recommend the substitution of glucose for cane sugar and the exclusion of glycerin in the official formula, and show that pills massed with honey or glucose preserve the iron in the ferrous state, and also that any oxidized iron is completely reduced in the course of a few weeks.

A formula suggested by Vallet, containing 38 per cent. of honey, is official in several foreign pharmacopœias, and the mass of ferrous carbonate of the U.S.P. contains an equal amount of honey. Honey contains about 80 per cent. of invert sugar, and it is therefore impossible to accurately determine the ferrous carbonate by titrating with bichromate in pills made by Vallet's or similar formulas.

The following results show the influence of glucose, honey, and milk sugar on the volume of bichromate required by a solution of ferrous sulphate, the strength of which had been accurately determined.

No.	Ferrous Sulphate Solution.	Added	Amount of N/10 Bichromate.	Excess of N/10 Bichromate.
Blank	10 mils	—	10·50 mils	—
33	10 mils	0·20 Gm. honey	12·20 mils	1·70 mils
34	10 mils	0·25 Gm. starch glucose	10·65 mils	0·15 mils
35	10 mils	0·20 Gm. milk sugar	10·83 mils	0·35 mils

From the above figures it will be seen that 0·20 Gm. of honey increases the amount of bichromate by 1·70 mils., so that it may be calculated that the presence of 38 per cent. of honey in Pilula Ferri would cause an error equivalent to 0·20 grain of $FeCO_3$, per 5-grain pill. The error due to the same percentage of starch glucose or milk sugar is much less, amounting to 0·014 and 0·040 grain of $FeCO_3$ respectively per 5-grain pill.

The total error due to organic matter in the various formulas is given below :—

Pilula Ferri, B.P. formula. Error equivalent to 0·6 per cent. $FeCO_3$, or 0·03 grain per 5-grain pill.

Pilula Ferri, Lucas's formula (with glucose), equivalent to 0·4 per cent. $FeCO_3$, or 0·02 grain per 5-grain pill.

Pilula Ferri, Lucas's formula (with honey), equivalent to 3·2 per cent. $FeCO_3$, or 0·16 grain per 5-grain pill.

Pilula Ferri, Vallet's formula (with honey), equivalent to 4·0 per cent. $FeCO_3$, or 0·20 grain per 5-grain pill.

It will be observed that the errors given above are in pills containing only 1 grain each of ferrous carbonate, so that, calculating on the amount of iron salt, the above percentages are multiplied by five, which makes the error appear more serious. The difficulty due to organic excipients is overcome in the folfowing method of assay, which gives very satisfactory results if carried out in the manner to be described.

The method depends upon the fact that when hydriodic acid is added to a ferric salt iodine is liberated and the iron is reduced to the ferrous state.

The details of the test are as follows :—

Take ten pills, and, if the pills are coated, remove as much of the coating as possible without losing any of the pill mass. Break up in a mortar and transfer to a 200 mils. measuring flask, together with a little potassium bicarbonate, and warm gently with 30 mils. of dilute sulphuric acid—10 per cent. by weight—until all the iron is in solution (the liberated carbon dioxide will prevent oxidation of the ferrous sulphate). Cool and dilute to 201 mils. (1 mil. allowed for insoluble matter). Filter rapidly through a plaited filter, and to 100 mils. of the clear solution add potassium bicarbonate until the liquid is of a deep-red colour, then add dilute sulphuric acid until this colour just disappears. Next add about 3 Gm. of potassium iodide, and allow to stand in the stoppered flask for thirty minutes. Titrate the liberated iodine with decinormal thiosulphate of soda solution, each mil.

of which is equivalent to 0·1789 grain of $FeCO_3$, (oxygen = 16·00) present in the ferric state, and the amount thus found divided by four gives the amount per pill of ferric salt calculated as ferrous carbonate.

To a further 50 mils. of the above filtrate add solution of potassium permanganate carefully, until the addition of another drop produces a pink colour which does not immediately disappear. The iron will then be completely oxidized. Add potassium bicarbonate, and follow the directions given in the first test. Determine the liberated iodine as before, with sodium thiosulphate. The result gives the total iron calculated as ferrous carbonate, and by subtracting that found in the first test the amount of ferrous salt—calculated as carbonate—is obtained.

Care must be taken that the potassium iodide used is free from iodate, as iodic and hydriodic acid react, and iodine is liberated, which would cause an error in the result. The coating may generally be removed from the pills by rolling between two smooth blocks of wood, when the outer cover will shell off. In cases where it is difficult to remove the coating, the pills may be broken up in a mortar and then treated with dilute acid as before described. A little extra allowance will have to be made for the increased amount of insoluble matter.

The Determination of Ferrous Carbonate in Capsules of Ferrous Carbonate.—Take five capsules, and after cutting off the ends wash the contents into a 6-oz. wide-mouthed stoppered bottle, with dilute sulphuric acid and chloroform. Add a little potassium bicarbonate (the carbon dioxide liberated will expel the air), and shake gently until all the iron is in solution.

Titrate with decinormal potassium permanganate, each mil. of which is equivalent to 0·1789 grain of ferrous carbonate (O = 16·00). Benzol may be substituted for chloroform if desired, as neither has any action on the permanganate. Ethyl ether and distilled petroleum ether, however, act on permanganate to an appreciable extent.

This method was found to yield very satisfactory results, but the absence of interfering organic matter must, of course, be assured.

Part III.—A Comparison of the Influence of Certain Organic Matter.

Potassium bichromate possesses an advantage over permanganate, inasmuch as it can be obtained in a greater state of

purity, and also that its solutions will retain their strength for a longer time. Another point in its favour is that bichromate may be used in the presence of hydrochloric acid, whereas permanganate is attacked by that acid unless certain precautions are observed. On the other hand, the tedious process of "spotting" in which a frequent change of ferricyanide solution is necessary, compares unfavourably with the quicker method and sharper end-point obtained with permanganate. It is generally supposed that permanganate is more readily attacked by organic matter than is the case with bichromate, and the following tests were made in order to compare the influence of certain organic substances on these reagents. A solution of ferrous sulphate was standardized, and to a measured volume was added the amount of organic matter stated, and the excess required of either reagent was determined. The tests were made at the ordinary laboratory temperature, sulphuric acid was used throughout, and the total dilution of the solution was about 50 mils.

No.	Ferrous Sulphate Solution.	Organic Matter.	Amount Added.	Vol. of N/10 Bichrom.	Excess N/10 Bichrom.	Vol. of of N/10 Permang.	Excess of N/10 Permang.
—	—	—		—	—	—	—
Blank	20 mils	—	—	17·80 mils	—	17·80 mils	—
36	20 mils	cane sugar	0·50 Gm.	18·05 mils	0·25 ml.	18·80 mils	1.00 mil
37	20 mils	cane sugar	0·10 Gm.	—	—	18·00 mils	0·20 mil
38	20 mils	dextrose	0·50 Gm.	19·0 mils	1·2 ml.	19·0 mils	1·2 mils
39	20 mils	levulose	0·50 Gm.	25 mils	7 ml.	20·8 mils	3·0 mils
40	20 mils	levulose	0·50 Gm.	—	—	19·8 mils	2.0 mils
41	20 mils	levulose	0·50 Gm.	–	—	17·90 mils	0.10 mil
42	20 mils	levulose	0·10 Gm.	20·3 mils	2·5 ml.	18·50 mils	0·70 mil
43	20 mils	invert sugar	0·50 Gm.	22·6 mils	4·8 ml.	19·8 mils	2·0 mils
44	20 mils	invert sugar	0·50 Gm.	23·7 mils	5·9 ml.	—	—
45	20 mils	invert sugar	0·20 Gm.	—	—	18·80 mils	1·00 mil
46	20 mils	invert sugar	0·10 Gm.	19·3 mils	1·5 ml.	–	—
47	20 mils	glucose	0·50 Gm.	18·30 mils	0·50 ml.	18·80 mils	1·00 mil
48	20 mils	honey	0·50 Gm.	—	—	19·90 mils	2·1 mils
49	20 mils	honey	0·30 Gm.	20·8 mils	3·0 ml.	—	—
50	20 mils	honey	0.10 Gm.	—	—	18.35 mils	0·55 mil
51	20 mils	glycerin	0·50 Gm.	22·8 mils	5·0 ml.	20·5 mils	2·7 mils
52	20 mils	glycerin	0.30 Gm.	21·2 mils	3·4 ml.	—	—
53	20 mils	glycerin	0·10 Gm.	—	—	19·1 mils	1·3 mils
54	20 mils	glycerin	0·05 Gm.	18·48 mils	0·65 ml.	—	—

It will be observed that, in the tests made with cane sugar, bichromate is only slightly affected, but that a considerable excess of permanganate was required. In the cases of levulose, invert sugar, honey and glycerin, a much larger volume of

bichromate than permanganate is required; with dextrose the error is equal, whilst glucose has a slightly greater action on permanganate than on bichromate.

The rapidity of adding the reagent influences the amount required, as will be seen in experiment No. 43, made by adding the bichromate quickly, and in No. 44, in which the bichromate was added slowly during five minutes.

In the paper on saccharated carbonate of iron it was stated that in all probability the nascent ferric salt was attacked by the organic matter, and this statement is borne out by experiments Nos. 40 and 41. In No. 40 half the volume of permanganate was added before the addition of the levulose, and in No. 41 about 17·5 mils. of the reagent was first added, and the total volume of permanganate then determined. The last test proves that very little excess of permanganate is required if the organic matter is added towards the end of the test.

The difference between the action of cane and other sugars is very curious and difficult to explain, but the above tests prove that with some organic substances permanganate is to be much preferred to bichromate.

All the tests given in these papers were made in the analytical laboratories of Messrs. James Woolley, Sons, and Co., Limited, of Manchester.

The author was congratulated on his maiden Conference effort, and a hope was expressed that he would be encouraged to do further work.

NOTE ON MEDICINAL RESINOIDS.

By D. B. Dott, Ph.C.

I have used the word "resinoid" as applicable to euonymin, gelsemin, hamamelin, hydrastin, iridin, leptandrin, and the like, although the word more properly applies to podophyllin and resin-like substances which are insoluble in water. Euonymin is the only one which has received official recognition in the form of dried extract, but the others have a well-established reputation, and some of them are widely used. Useful papers have been published on the characters and purity of these resinoids. I would refer particularly to that of A. R. Bennet

(*Pharm. Journ.* [3], 18, 895), and to that of Cowie and Dickson (*Pharm. Journ.*, lxxvi., 220). The former writer found the ash in pale green euonymin to vary from 34 to 45 per cent. In a dark green sample 14 per cent. was found. In a sample of brown euonymin 14 per cent. of inorganic matter was also found. Mr. Bennet examined several samples of hydrastin, and found the ash to vary from traces up to 20 per cent. Messrs. Cowie and Dickson found in euonymin 66 per cent. of matter other than real euonymin. In one of the samples this large percentage consisted mainly of kieselguhr, which they describe as an adulterant. A sample of iridin contained, besides 12·4 per cent. mineral matter, no less than 58 per cent. insoluble organic matter. I have from time to time examined samples of nearly all the resinoids used in medicine, and can confirm that they generally contain added inorganic matter, and sometimes organic matter. Gelsemin and hydrastin are most free from admixture, although as much as 20 per cent. extraneous matter has been reported in hydrastin.

There has been a tendency to regard these added matters as adulterations, but they are without doubt in the main justifiable additions. The principle is recognized in the official extract of euonymus, which contains one-fourth part of calcium phosphate. There is no other method of preparation available but evaporation as an extract in those cases in which the active principles consist wholly or partly of compounds soluble both in water and spirit. And in every case it is more or less noticeable that the dried extract has a tendency to absorb moisture, so that the particles of powder gradually cohere and form a solid mass. This is a very objectionable property in a powder, and it is well worth while avoiding it by the addition of a suitable desiccant. Really the only question is as to the amount and kind of substances to be added. Certainly the published results show that there is great room for improvement in this department. In determining the proportion of desiccant to be added account must be taken of the strength of spirit used in extracting. Seventy per cent. alcohol removes much less useless extract than the official 45 per cent. strength. Consequently a euonymin containing 50 per cent. extraneous matter may be as good as the B.P. preparation with only 25 per cent. Seventy per cent. alcohol is a good general strength of spirit to employ, and is suitable for the removal of all the active principles involved, whether alkaloidal salts, resins, glucosides, or neutral principles.

Although the extracts vary in their hygroscopic properties, I think the official proportion of 25 per cent. of desiccant is a good one, and might be adopted in every case, except in that of hydrastin, which does well enough with 10 per cent. It may be debated which is the best substance or mixture to be used in forming the dry extract. A mixture of 8 parts each of calcium phosphate, sugar of milk and dried sodium sulphate, with 1 part magnesia, answers very well. For hydrastin I would use sulphate of soda alone. The green extracts were supposed presumably to be made from leaves, but it may be doubted whether they are usually so made. Leaves generally yield more extract, and their extracts are more difficult to dry, than those of the corresponding bark or root. Unless it could be shown that the leaves contain the desired principles in greater or better proportion, there would be no object in preferring them to other parts of the plant as a source of resinoid.

NOTE ON THE PROPERTIES OF ANTIMONIUM SULPHURATUM, B.P.

BY DAVID LLOYD HOWARD AND J. BRISTOWE P. HARRISON, F.I.C.

In the preparation of this substance on a manufacturing scale, although fully convinced that the "official" details have been faithfully carried out, we have never yet succeeded in obtaining a product that would satisfactorily conform to the tests laid down in the British Pharmacopœia.

The quantitative test states that "3 Gm. moistened and warmed with successive portions of nitric acid, until red fumes cease to be evolved, and then dried and heated to redness, should leave a white residue weighing about 2 Gm."

Although, undoubtedly, a preparation of complex nature, we shall attempt to show that Antimonium Sulphuratum, if carefully prepared, is fairly constant in composition, within comparatively small limits. "About 2 Gm.", however, is a vague kind of quantitative definition, and as we had never succeeded in obtaining a manufactured sample yielding more than 1·75 Gm. residue, by the above test, we determined to investigate the matter. Accordingly an experimental batch was prepared in the laboratory, using one-fourth of all the materials mentioned in the B.P. On treating 3 Gm. of the laboratory product with nitric acid, as mentioned in the test, only 1·66 Gm. of residue

were obtained, which was identical in amount with that obtained from the article manufactured on a large scale from the same consignment of antimonious sulphide.

A deficiency of 17 per cent. on the official limit could scarcely be considered satisfactory, and it seemed possible that a determination of the composition of the antimony sulphide used might throw some light on the matter. This, however, did not prove to be the case, for on analysis the total impurities were found to amount only to about 2·0 per cent., and the following figures were obtained :—

	Percentages.
Antimony Sulphide (Sb_2S_3)	97·82
Lead Sulphide	0·41
Iron Sulphide	0·75
Nickel Sulphide	trace
Gangue	0·93
	99·91

From these results we could only conclude that the "official" figure for residue is much too high, and in order to confirm our opinion, if possible, we obtained samples from two other manufacturers, one of which, labelled "Antimonium Sulphuratum" we denote as "A"; the other, marked "Antimonium Sulphuratum B.P.," we call "B."

On treating 3 Gm. of each of these with nitric acid and igniting the residue, the "A" sample gave 1·62 Gm., while 1·68 Gm. of residue were obtained from the sample "B." The abnormal appearance of the residue obtained from "B" led us to investigate it further, and on treatment with water it was found to contain a very large percentage of sodium sulphate, suggesting either very careless preparation or gross adulteration. The soluble salts in the original sample were then compared with those of our laboratory preparation, with the following results :—

	Soluble Salts.
Laboratory preparation	9·6 per cent.
Sample "B"	51·6 ,, ,,

A further examination of these revealed that the soluble salts from "B" consisted almost entirely of sodium sulphate, while those of the laboratory sample gave the merest indication of sulphates. A similar examination of the preparation "A" showed it to be a carefully-made preparation.

Notwithstanding the fact that in the preparation of sulphurated antimony the British Pharmacopœia directs the final, pro-

duct to be washed with distilled water till free from sulphates in describing the "characters and tests" of this substance, no mention whatever is made of a qualitative test for sulphates. It will be at once clear, however, from the above figures for the residue, that, without this qualification, wholesale sophistication is possible, and still at the same time the amount of residue obtained by treatment with nitric acid may be very close to that given by a genuine and carefully prepared sample.

Any one who has tried the test which states in the B.P. that Antimonium Sulphuratum is "readily dissolved by solution of sodium hydroxide" cannot fail to realize that the test, as there stated, is impossible, for there is invariably a precipitate produced. At first, perhaps, it is not easily apparent in what respect such a test differs from the well-known one of dissolving ordinary antimony sulphide in caustic soda solution, whereby a clear solution is readily obtained, but the two reactions differ to a considerable extent, and what really takes place in the case of the sulphurated antimony may be thus explained :—The antimony preparation can for all practical purposes be considered to be a mixture of the two sulphides of antimony with large excess of sulphur. On treatment with caustic soda solution this reacts with the sulphur to form sodium polysulphide and sodium thiosulphate; these in turn react with the mixture of sulphides of antimony, which in solution may be considered as a mixture of antimony trisulphide and excess of sulphur—and thus sodium thioantimonate in solution is obtained and sodium metantimonate is precipitated. These reactions are represented by the following equations :—

$$6NaHO + 12S = 2Na_2S_5 + Na_2S_2O_3 + 3H_2O.$$

$$8Sb_2S_3 + 4S + 2Na_2S_5 + Na_2S_2O_3 + 30NaHO = 6NaSbO_3 + 10Na_3SbS_4 + 15H_2O.$$

The following experiments all tend to confirm that this is the most probable explanation of the formation of the precipitate :—

(*a*) The same reaction can be carried out in the two stages represented by the above equations by adding a solution of sulphur in caustic soda solution to a clear solution of antimony sulphide in sodium hydrate, when the same final products are obtained as before, viz., sodium thioantimonate in solution and a precipitate of sodium metantimonate. (*b*) If a small quantity of Antimonium Sulphuratum be heated in a combustion tube in a current of carbon dioxide so as to drive off the excess of sulphur,

the residue, consisting for the most part of antimony trisulphide, will be found to be readily soluble in caustic soda solution. (*c*) One gramme of Antimonium Sulphuratum, when treated with 10 C.c. of solution of sodium hydroxide B.P. and boiled, yielded a precipitate which, when washed twice by decantation, collected on a filter, and dried at 100°C., weighed 0·3 Gm. The precipitate, if present in the original substance, can certainly only exist in very minute amount, as shown by experiment (*b*); furthermore, it is formed most readily on treatment with soda, even after the suphurated antimony has been warmed for some time with 10 per cent. hydrochloric acid, in which sodium metantimonate is soluble.

Summary.

The conclusions to be drawn from this investigation are :—

1. That three grammes of Antimonium Sulphuratum will not yield 2 Gm. of residue by means of the test described in the British Pharmacopœia.

2. That it is possible for a sample to contain as much as 30 per cent. anhydrous sodium sulphate—this was the amount actually found in Sample B—and still yield a residue figure very close to that obtained from a genuine and carefully-prepared sample.

3. That sulphurated antimony is not readily dissolved by solution of caustic soda.

We therefore venture to suggest that the "characters and tests" enumerated in the B.P. monograph should be thus modified :—

Characters and Tests.—An orange-red powder, readily dissolved by hot hydrochloric acid, with the evolution of hydrogen sulphide and the separation of sulphur. On treatment with hot water and filtering, the clear solution should not contain more than a trace of sulphates. Three grammes moistened with dilute nitric acid with successive portions of fuming nitric acid until red fumes cease to be evolved, then evaporated to drive off excess of water, and carefully heated to redness to expel sulphuric acid, should leave a whitish residue, weighing not less than 1·6 and not more than 1·8 Gm. Sulphurated antimony should not yield more than the slightest characteristic reactions for arsenium when tested with stannous chloride.

FALSE CALUMBA ROOT.

By S. Taylor, Ph.C.

Some few months ago Mr. E. M. Holmes submitted to me for examination a small sample of a sliced root which had been detected by a London wholesale house mixed with calumba root in small percentage. Seeing that the root had not the characteristic bitter taste of calumba, Mr. Holmes was desirous that it should be possible to detect the adulterant in powdered calumba root, should such an adulteration occur.

The sample examined measured 6·5 Cm. long, 3 Cm. broad,

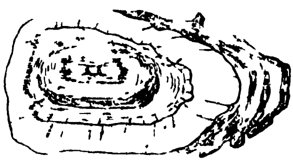


Fig. 1.—The Root.

and 0·5 to 0·8 Cm. thick (Fig. 1), and had been cut from a root of diameter 5·0 Cm. in a very slanting direction. In general appearance the slices of root much resemble poor qualities of calumba root, but are distinguishable from that drug by their brownish-red appearance, which is particularly striking, pervading as it does all parts of the root, especially the central parenchyma. Minute crystals are distinguishable under the lens. It has a somewhat thick cork of a dark-grey colour. The central depression of the slices is not as marked as in calumba, and under the lens they are more densely and markedly radiate.

The general microscopical characters of the root are closely akin to those of calumba in the type, disposition, and extent of the bast and wood-bundles, medullary rays, etc. As in calumba starch is very plentiful, and the grains are about the same size, i.e., 20μ to 60μ, or even more, the majority being about 30μ (Fig. 2). The hilum of the grains is, however, different to

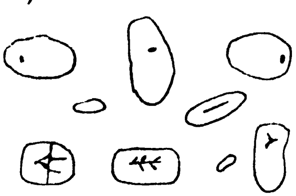


Fig. 2.
(*a*) Starch of False Calumba.

Fig. 3.
(*b*) Starch of True Calumba.

that of calumba starch (Fig. 3) and is also less distinct. The crystals of calcium oxalate are a distinguishing feature of the root, and exist in two forms, as acicular raphides, large and numerous, and as rosettes 50μ to 70μ in diameter. They are distributed through all parts of the root. The colouring matter, of a brownish-red colour, is also present throughout the root, and is extremely plentiful. It gives a deep red colour with solution of potash, and with solution of ferric chloride it turns black. These two last facts are sufficient to distinguish the false root from the true :—(*a*) The presence of sphæraphides and acicular raphides, and the absence of the isolated crystals which are found in the large stone cells of calumba. (*b*) The presence of red colouring matter and the absence of yellow colouring matter.

A peculiar feature of the root is the differentiation of certain cells beginning in the cortical parenchyma, near the periphery. These become thickened to a considerable extent without lignification. Later, as the extent of the thickening increases, the groups become surrounded by a ring of cork. The cells, which are suberized, take the form and disposition of ordinary cork tissue, but owing to pressure the individual shape of the cells soon becomes lost, and the whole appears as an irregular circle of suberized tissue surrounding a thickened parenchyma. At the same time slight lignification takes place at the periphery of the group of thickened cells. In its final state of development the whole system becomes enlarged to a considerable extent, measuring about 0·5 Cm. in diameter, decomposition of the cell-wall sets in, and the result is a large and irregular circle of corky tissue enclosing a mass of brownish-black colouring matter. Strands of axially elongated sclerenchymatous cells traverse the root at irregular intervals.

The two samples of root submitted yielded 5·2 and 6·8 per cent. of ash respectively. The tincture prepared from the root with 60 per cent. alcohol yielded 2·03 per cent, of extractive, considerably more than is yielded by tincture of calumba. This tincture was of a bright red colour, gave a brownish-red precipitate, and a slightly yellow filtrate on treatment with acids. In the attempt to separate an alkaloid the finely powdered root was boiled under a reflux condenser with 60 per cent. alcohol for half an hour. The product was filtered and treated in a separator with ammonia and chloroform. On evaporation the separated chloroform yielded no residue. The chloroform was also extracted

with dilute hydrochloric acid, and the acid liquor gave no precipitate with the usual alkaloid reagents. Similar negative results were obtained with chloroform and ether. On extraction with petroleum ether there was a yield of a very minute quantity of white acicular crystals, much too small in quantity for examination.

In conclusion, I must express my thanks to Mr. Holmes, both for the opportunity he has afforded me for examining this root, and for his help during the work.

NOTE ON EXTRACTUM FUCI VESICULOSI LIQUIDUM.

By F. C. J. Bird.

The efficacy of *Fucus vesiculosus* is understood to depend largely on the iodine and bromine compounds which it contains. Some little time ago a liquid extract of *Fucus vesiculosus* prepared according to the B.P.C. Formulary was supplied to a well-known physician, who returned it with the statement that it contained no iodine or iodine compounds. No information was forthcoming as to what test had been applied, but investigation showed that if tested in the ordinary way it was quite easy to miss the iodine, and get no reaction with starch paste, probably on account of the interference of the other halogens present with the iodine. The method with hydrogen peroxide was, however, found to work satisfactorily, and the presence of iodine could be demonstrated if necessary in a very small quantity of the preparation. The test is applied as follows:—Evaporate a few mils. of the liquid extract to dryness, and burn at as low a temperature as possible. Treat the powdered residue with a little boiling water, filter, acidify strongly with acetic acid, and add a few drops of solution of peroxide of hydrogen. This liberates the iodine after standing for a short time, and if chloroform be added, the iodine dissolves to a rose-violet solution which readily affords the usual reaction with starch.

CHEMICAL EXAMINATION OF THE BARKS OF BRUCEA ANTIDYSENTERICA, LAM., AND BRUCEA SUMATRANA, ROXB.

BY ARTHUR H. SALWAY, PH.D., AND WALTER THOMAS.

1.—EXAMINATION OF THE BARK OF BRUCEA ANTIDYSENTERICA. *By Arthur H. Salway, Ph.D.*

A small quantity of this bark was obtained through the kindness of H.B.M. Minister, Lieut-Colonel Sir J. L. Harrington, K.C.V.O., C.B., at Adis Ababa, Abyssinia, and it was deemed of interest to compare its constituents with those of the fruit of the same species of *Brucea*, more especially with reference to the bitter principle contained in the latter, since both parts of the plant are stated to be used with success in Abyssinia in the treatment of diarrhœa and fever, (compare Engler, "Die natürlichen Pflanzenfamilien," Theil III., Abtheil. 4, p. 220, Leipzig, 1896).

The bark was in small fragments of a light brown colour, and possessed a slightly bitter taste. As a preliminary experiment a portion of the finely ground material was extracted successively in a Soxhlet apparatus with various solvents, when the following amounts of extract, dried at 100°C., were obtained:—

Petroleum (b p. 35–50°C) . .	extracted	1·22	per cent.
Ether	,,	0·96	,,
Chloroform	,,	0·78	,,
Alcohol	,,	8·48	,,
Water	,,	7·22	,,
Total . .		18·66	per cent.

For the purpose of a complete examination of the constituents of the bark, a quantity (675 Gm.) of the finely ground material was extracted with hot alcohol. After the removal of the greater portion of the alcohol, the thick, dark-coloured extract was brought into a distilling flask, water added, and steam passed through the mixture in order to separate any volatile substances, The distillate, which contained a few oily drops and had an acid reaction, was extracted with ether. This removed a very small quantity (about 0·2 Gm.) of a yellowish-brown *essential oil,* which, on standing, partially solidified. The acids which remained in the aqueous portion of the distillate were converted into a barium salt, and, although the amount of this was also very small, it afforded reactions which indicated

the presence of *formic* and *butyric acids*, with apparently traces of *acetic acid*.

After the steam distillation, the contents of the distilling flask consisted of an aqueous liquid (A) and a quantity of resin (B) which were separated by filtration.

(A) The Aqueous Liquid.

This liquid was concentrated under diminished pressure to a small bulk. It then possessed a deep red colour and a very bitter taste, was coloured brown with ferric chloride, yellow with alkalies, readily reduced Fehling's solution on heating, and gave a copious precipitate with tannic acid.

With the endeavour to isolate the bitter principle, the liquid was repeatedly extracted with chloroform, as described in connexion with the examination of the fruit of *Brucea sumatrana* (compare Power and Lees, "Year-Book of Pharmacy," 1903, p. 503, and *Pharm, Journ*, 1903, 71, p. 183). The combined chloroformic liquids were washed with a little water, dried with calcium chloride, and the chloroform removed, when 1·6 Gm. of a dark brown, amorphous product was obtained, which possessed a bitter taste. For the purpose of its purification it was dissolved in a little alcohol, mixed with prepared sawdust, and the thoroughly dried mixture then extracted in a Soxhlet apparatus with perfectly dry ether. This yielded about 1 Gm. of a viscid, dark-brown product, similar in appearance and properties to the chloroform extract from which it had been obtained.

The aqueous liquid which had been extracted with chloroform, as above described, was treated with a slight excess of basic lead acetate. This produced a voluminous, deep yellow precipitate, which was separated by filtration with the aid of a pump, and washed with a little water.

Basic Lead Acetate Precipitate.—This was suspended in water, decomposed by hydrogen sulphide, and the mixture filtered. On concentrating the filtrate under diminished pressure, a reddish-brown liquid was obtained, which, on long standing, deposited a brown, amorphous solid, but nothing crystalline could be isolated from it. The liquid gave with ferric chloride a green coloration, indicating the presence of *tannin*.

Filtrate from Basic Lead Acetate Precipitate.—This was treated with hydrogen sulphide for the removal of the lead, the mixture filtered, and the filtrate concentrated under diminished pressure. The light-brown syrupy liquid thus obtained still possessed a

very bitter taste, and readily reduced Fehling's solution on heating, but gave no precipitate with tannic acid, and only a faint brown coloration with ferric chloride. With phenylhydrazine acetate it yielded a crystalline osazone, which melted at 205°C., and therefore evidently contained a considerable amount of *glucose*.

(*B*) *The Resins.*

The resinous substances, which had been separated from the aqueous liquid, as above described, formed a brittle, black, amorphous solid. This was dissolved in a little alcohol, mixed with prepared sawdust, and the thoroughly dried mixture then extracted successively in a Soxhlet apparatus, with the following solvents :—

Petroleum (b p. 35-50°C.)	extracted	9·90	Gm.
Ether	,,	4·40	,,
Chloroform	,,	3·00	,,
Ethyl Acetate	,,	0·45	,,
Alcohol	,,	4·80	,,
Total		22·55	Gm.

The portion of resin extracted by the light petroleum was a soft, dark-coloured, wax-like mass. It was heated with an alcoholic solution of potassium hydroxide, the alcohol then removed, water added, and the mixture extracted with ether. The ethereal liquid yielded about 1 Gm. of a solid substance, which, after one crystallization from ethyl acetate containing a little dilute alcohol, separated in large flat plates, melting at 133°C. This substance, when dissolved in chloroform, gave on the addition of a little acetic anhydride and a drop of concentrated sulphuric acid the colour reaction characteristic of the phytosterols. It was analysed, with the following result —

0·5161, when heated at 110°C., lost 0·0269 H_2O. H_2O=5·2.
0·1503 of anhydrous substance gave 0·4555 CO_2 and 0·1614H_2O.

$$C=82{\cdot}7,\ H=11{\cdot}9$$

$C_{20}H_{34}O$, H_2O requires H_2O=5·8 per cent.
$C_{20}H_{34}O$ requires C=82·8, H=11·7 per cent.

The substance was thus identified as a *phytosterol*, and it appears to be identical with that isolated from the fatty oil from the fruit of both *Brucea antidysenterica* and *B. sumatrana* (*loc. cit.*).

The alkaline liquid from which the phytosterol had been

extracted, as above described, was acidified with sulphuric acid and again extracted with ether. About 2 Gm. of solid fatty acids were thus obtained, which were crystallized from alcohol, but it was found impossible to separate them in a state of sufficient purity to permit of their identification.

The portions of resin extracted by the other above-mentioned solvents were, as indicated, small in amount, and no crystalline substances could be isolated from them.

This investigation of the bark of *Brucea antidysenterica* has shown that, like the fruit of the same species, it contains some bitter substances, but in neither case could these be obtained in the form of definite products.

II.—Examination of the Bark of Brucea Sumatrana.

By Walter Thomas.

A quantity of the bark of this species of *Brucea* was obtained through the kindness of Mr. H. N. Ridley, Director of the Botanic Gardens of the Straits Settlements, Singapore. Its collection was attended with considerable difficulty, for, as stated in a communication from Mr. Ridley to Messrs. Burroughs, Wellcome, and Co., of London, the plant is a tender shrub, the stems of which are barely an inch in diameter, and the bark not easily removed. It was also noted that, although the bark is distinctly bitter, it is much less so than the fruit, and therefore probably contains less of the bitter principle.

The bark was in thin strips, of a light brown colour externally, and paler on the inner surface. A portion of the finely ground material was extracted successively in a Soxhlet apparatus with various solvents, when the following amounts of extract, dried at 100°C., were obtained:—

Petroleum (b.p. 35-50°C.) . .	extracted	0·42 per cent.
Ether	,,	0·68 ,,
Chloroform	,,	0·86 ,,
Alcohol	,,	2·40 ,
Water		5·62
	Total	9·98 per cent.

For the more complete examination of the constituents of the bark, a quantity (3833 Gm.) of it, in moderately fine powder, was extracted by percolation, first with cold alcohol and subsequently with hot alcohol, as it was found that the latter removed a considerable quantity of a substance which was practically

insoluble in cold alcohol, and separated from the hot alcoholic extract on cooling in the form of a light brown gelatinous mass. The two extracts were, therefore, separately examined.

Extract Obtained with Cold Alcohol.—This extract, after the removal of the greater part of the alcohol, was very dark in colour. It was brought into a distilling flask, mixed with a little water, and steam passed through the mixture in order to separate any volatile substances. The distillate, which had a strongly acid reaction, was extracted with ether. This removed a small quantity (2·5 Gm.) of a light greenish-yellow *essential oil*, having a rather unpleasant odour, but the amount was much too small to permit of its further examination. The acids remaining in the aqueous distillate were converted into their barium salts, which formed a yellowish-brown syrup, and gave reactions indicating the presence of *formic*, *acetic*, and *butyric acids*.

The aqueous liquid remaining in the distilling flask was separated from a quantity of black, amorphous resin by filtration, and the filtrate clarified by shaking out once with ether. It was then extracted with chloroform until nothing further was removed. After distilling off the chloroform there remained a small amount (1·8 Gm.) of a dark red, viscid product. This was dissolved in alcohol, and the solution poured into a quantity of boiling water, which caused the separation of a very small amount of resin. The filtered aqueous liquid was then concentrated, mixed with prepared sawdust, and the mixture, after thorough drying, extracted in a Soxhlet apparatus with dry ether. During the process of extraction a small amount of an amorphous, scarlet-coloured solid separated on the side of the flask, and finally, after the removal of the ether, a deep-red syrupy liquid was also obtained. The whole of this ether extract was then dissolved in alcohol, the solution filtered, and allowed to stand for several weeks, but nothing crystalline separated. Although this deep red extract possessed a strongly and persistently bitter taste, it was evidently different from the bitter principle isolated by a similar method from the fruit of this species of *Brucea* (compare Power and Lees, "Year-Book of Pharmacy," 1903, p. 503, and *Pharm. Journ.*, 1903, 71, p. 183).

Inasmuch as the last-mentioned bitter principle had only been obtained in the form of an amorphous powder, it was deemed of interest to ascertain whether any simple derivative of it could be obtained in a crystalline state. Attempts were, therefore, made to prepare acetyl and benzoyl derivatives,

respectively, but in both cases the substance was recovered in an apparently unchanged condition.

The aqueous liquid which had been extracted with chloroform, as above described, was treated with basic lead acetate, which produced a voluminous yellow precipitate. This was collected, washed, suspended in water, and decomposed by hydrogen sulphide, but it finally afforded only a dark brown uncrystallizable syrup, which gave no colouration with ferric chloride.

The filtrate from the basic lead acetate precipitate was treated with hydrogen sulphide for the removal of the lead, filtered, and concentrated under diminished pressure. It then formed a dark brown syrup, from which a small amount of a crystalline substance separated; this was found to consist of a mixture of potassium chloride and nitrate. The syrup, even after heating with hydrochloric acid, did not reduce Fehling's solution. When heated with caustic alkali it evolved ammonia, and therefore probably contained protein substances.

Extract obtained with Hot Alcohol—This product was re-dissolved in hot alcohol, and the solution filtered. On cooling, a quantity of a light brown, amorphous, resinous substance separated. This was collected on a filter, then mixed with prepared sawdust, the mixture dried and extracted successively in a Soxhlet apparatus with petroleum, chloroform and alcohol.

(*a*) *Petroleum Extract*—This was a light green fatty solid, amounting to 5 Gm.

(*b*) *Chloroform Extract*—This was a dark brown friable resin, amounting to 12 Gm.

(*c*) *Alcohol Extract.*—This was also a dark brown resin, amounting to only 1·2 Gm.

The petroleum extract (*a*) was hydrolyzed with an alcoholic solution of potassium hydroxide. The product, after the removal of the alcohol, was mixed with water, and the alkaline liquid extracted with ether. This removed a very small amount of a substance which, after recrystallization from alcohol, and finally from ethyl acetate, was obtained in colourless crystals, melting at 75° C. The melting point of this substance agrees with that of the hydrocarbon *pentatriacontane*, $C_{35}H_{72}$, but the amount was insufficient for analysis.

The alkaline liquid, after extraction with ether, was acidified with sulphuric acid and distilled in steam. The distillate, which contained a few oily drops, was extracted with ether, and on removing the latter a very small amount of a liquid was obtained

having the characters of *butyric acid.* The acid remaining in the aqueous distillate was converted into a barium salt, and found to consist chiefly of *formic acid,* with apparently a little acetic acid. After the above-mentioned steam distillation there remained on the surface of the liquid in the distilling flask a light green fatty solid. The whole was extracted several times with ether, and, after the removal of the latter, a residue was obtained which was crystallized several times from light petroleum, then from ethyl acetate, and finally again from light petroleum. The acid so obtained melted at 66–67° C., and on analysis gave the following result :—

0·1128 gave 0·3200 CO_2 and 0·1362 H_2O. C=77·3, H=13·4
$C_{22}H_{44}O_2$ requires C=77·6, H=13·0 per cent.

It would thus appear probable that this substance was behenic acid, the melting point of which has been variously stated to be 73° C. (Völcker) 75° C. (Meyer and Jacobsen), and 80–82° C. (Lewkowitsch), and that the exceptionally low melting point observed in this instance was due to a slight impurity.

The chloroform extract (*b*) and the alcohol extract (*c*) of the resins obtained by extracting the bark with hot alcohol, as above described, did not appear to contain anything of chemical interest.

In view of the difficulty of obtaining any quantity of the bark of *Brucea sumatrano*, and the fact that it contains a much smaller proportion of bitter principles than the fruit, it would appear that the latter is to be preferred for medicinal use.

The Wellcome Chemical Research Laboratories, London

CHEMICAL EXAMINATION OF THE FRUIT OF BRUCEA ANTIDYSENTERICA, LAM.

By Frederick B. Power, Ph.D., and Arthur H. Salway, Ph.D.

In a paper communicated to the British Pharmaceutical Conference in 1903, entitled "Chemical Examination of Kô-sam Seeds" (the fruit of *Brucea sumatrana*, Roxb.), it was noted in conclusion that "it would also be of interest to determine, by a comparative examination, the constituents of the closely allied Abyssinian plant, *Brucea antidysenterica*, which, on account

of the properties indicated by its name, is highly esteemed in its native country (compare Power and Lees, "Year-Book of Pharmacy," 1903, pp. 503–522; *Pharm. Journ.*, 1903, 71, pp. 183–189). In the previous communication reference was likewise made to a notice concerning this plant by Engler in "Die natürlichen Pflanzenfamilien." Theil III., Abtheil, 4, p. 220, Leipzig, 1896, where it is stated that "the bark and the fruits of *Brucea antidysenterica* are used with success in Abyssinia for diarrhœa and fever."[1]

It is now possible to record the results of a chemical examination of the Abyssinian species of *Brucea*, since a quantity of both the fruit and bark of the latter plant was placed at our disposal by Messrs. Burroughs, Wellcome and Co., of London. The material was obtained by them through the kind services of H.B.M. Minister, Lieut.-Colonel Sir J. L. Harrington, K.C.V.O., C.B., at Adis Ababa, Abyssinia, who refers to the plant, *Brucea antidysenterica*, under the name of "waginus," and states that it is chiefly found in the province of Gojam, although he had considerable difficulty in getting it brought to Adis Ababa. Dr. W. A. M. Wakeman, also of the British Legation at Adis Ababa, in sending a quantity of material, likewise noted that it was very difficult to obtain. He reported, furthermore, the following information: "The kernels of the dried seeds (crushed) are used occasionally by the natives of these parts where it grows, both externally and internally. Among some of its uses are those of a purgative, vermifuge, and alterative internally, while the local application to raw wounds is believed to encourage granulation and arrest putrefaction." To all the above gentlemen who have aided us in this investigation our acknowledgments are due.

Experimental.

The fruits of *Brucea antidysenterica*, as received by us, were considerably larger and more coarsely reticulate than those of *B. sumatrana* ("Kô-sam seeds"), and also much lighter in colour. As an indication of their relative weights it may be noted that about five of the former and thirty of the latter, respectively, weigh 1 Gm. The kernel of the seed possesses an intensely and persistently bitter taste.

[1] Since the publication of the above-mentioned paper the anatomical characters of *Brucea sumatrana* and *B. antidysenterica* have been studied by R. Müller (*Pharm. Journ.* 1905, 74, p. 76, from *Zeitschr. d. Œsterr Apoth. Vereins*, 1904, Nos. 29–36).

As a preliminary experiment, a portion of the crushed fruit was extracted successively in a Soxhlet apparatus with the following solvents, and the resulting extracts finally dried in a water oven until of constant weight—

Petroleum (b.p. 35–50° C.)	extracted	19·15 per cent.
Ether	"	1·05 "
Chloroform	"	2·20 "
Alcohol	"	6·95 "
	Total	29·35 per cent.

For the complete examination of the constituents of the fruit, 2030 Gm. of the crushed material were extracted in a large Soxhlet apparatus, first with light petroleum (b.p. 35–50° C.), and subsequently with hot alcohol.

I. Examination of the Petroleum Extract.

This extract was first heated on a water bath and then kept for some time in a vacuum, in order to remove the solvent as completely as possible, when it amounted to 450 Gm., corresponding to 22·16 per cent. of the weight of the fruit. It had the characters of a fatty oil, and was of a brownish-yellow colour. Its constants were determined, with the following results:—Specific gravity 18°/18° C.=0·9025; iodine value=81·5; acid value=2·3; saponification value=185·4.

From these data it was evident that the fatty oil contained a large proportion of the glycerides of unsaturated acids,, triolein for example, having an iodine value of 86·2.

The fatty oil was then brought into a flask and a current of steam passed through it, but the distillate contained neither volatile acid nor essential oil. After separating the water from the fatty oil, the latter was mixed with alcohol and hydrolyzed by boiling for a short time with an alcoholic solution of potassium hydroxide (120 Gm). The greater portion of the alcohol was then removed, the strongly alkaline, semi-solid product of hydrolysis mixed intimately with clean sand, the mixture thoroughly dried on a water bath, and finally extracted in a Soxhlet apparatus with light petroleum.

Isolation of a Phytosterol, $C_{20}H_{34}O$.

The petroleum extract was of a bright yellow colour, and, after removing the solvent, a quantity (1.5 Gm.) of a yellow solid was

obtained. This was dissolved in a mixture of ethyl acetate and alcohol containing a little water, when a substance separated in colourless, glistening plates, which, after several crystallizations, melted at 135–136° C. This substance, when dissolved in chloroform, gave on the addition of a little acetic anhydride and a drop of concentrated sulphuric acid the colour reaction characteristic of the phytosterols. It was analysed, with the following result:—

0·3168, when heated at 110° C., lost 0·0172 H_2O. H_2O=5·4.
0·1004 of the anhydrous substance gave 0·3030 CO_2 and 0·1083 H_2O. C=82·3; H=12·0

$C_{20}H_{34}O$ requires C=82·8; H=11·7 per cent.

$C_{20}H_{34}O, H_2O$ requires H_2O=5·8 per cent.

This substance is thus seen to be a *phytosterol*. It is apparently identical with the compound of the same empirical formula which had previously been isolated from the fatty oil of the fruit of *Brucea sumatrana* (*loc. cit.*). The mother liquors from the first crystallization of the phytosterol afforded, as is usually the case, a small quantity of a deep yellow, viscid liquid.

Acids Obtained by the Hydrolysis of the Fatty Oil.

Having removed the neutral constituents of the hydrolyzed oil, the residual mixture of potassium salts and sand was repeatedly extracted with hot water, and the aqueous, strongly alkaline solution acidified with sulphuric acid, when the liberated fatty acid separated on the surface of the liquid as a partially solid mass. The mixture was then distilled in steam, and a very small amount of volatile acid thus obtained, which, after conversion into a barium salt, afforded the reactions of *acetic* and *butyric acids*.

The acids remaining in the distilling flask were extracted with chloroform, the resulting solution washed with water, dried with calcium chloride, and the solvent removed, the last traces of chloroform being expelled by heating on a water bath under diminished pressure. About 250 Gm. of mixed fatty acids were thus obtained, the constants of which were determined with the following results:—Melting point 27–28° C.; specific gravity 30°/30°C.=0·8980; iodine value=83·5; acid value=186·1; acetyl value=4·5.

From the iodine value, as determined by Hübl's method, it

was concluded that the mixture consisted largely of unsaturated acids, oleic acid, for example, having an iodine value of 90·1. On the other hand, the acid value 186·1 indicated that only a small quantity of acids having a higher molecular weight than stearic and oleic acids were present, the acid values of the latter two acids being 197·5 and 198·9 respectively.

In order to separate the constituents of the mixed fatty acids, the solid portion, amounting to about 50 Gm., was first removed by filtration at the pump. It was fractionally crystallized from alcohol, when the first deposits melted at 60–62° C., but after four successive crystallizations melted constantly at 69·5° C. This was evidently a pure substance, and was analysed—

0·1710 gave 0·4748 CO_2 and 0·2022 H_2O. C=75 7; H=13·1,
$C_{18}H_{36}O_2$ requires C=76·1; H=12·7 per cent.

This substance was thus identified as *stearic acid.*

The mother liquors resulting from the above fractionation contained a considerable quantity of an acid which, after repeated crystallization, separated in glistening leaflets melting at 57-60° C. Although this could not be obtained perfectly pure, it was analysed, with the following result.—

0·1681 gave 0·4636 CO_2 and 0·1898 H_2O. C=75 2; H=12·5.
$C_{16}H_{32}O_2$ requires C=75·O; H=12 5 per cent.

It is evident that this substance was *palmitic acid.*

The liquid acids, which were separated by filtration from the above-described solid portion, were considerable in amount, the weight being about 200 Gm. In order to effect a separation of the liquid acids they were converted into their methyl esters. For this purpose the oily liquid was dissolved in an excess of methyl alcohol, and, while being heated on a water-bath in a flask provided with a reflux condenser, a current of dry hydrogen chloride was passed through the solution for two hours. The greater part of the alcohol was then removed, water added, and the ester extracted with ether. The ethereal solution was shaken with an aqueous solution of sodium carbonate to remove any traces of unesterified fatty acids, then washed with water, dried, and the ether removed. The methyl esters were finally subjected to fractional distillation under a pressure of 13 Mm., when a number of fractions were collected having the characters below indicated.

Fractions.	Boiling Point	Amount	Spec. Gravity. 16°/16° C.	Iodine Value.
		Gm.		
I. .	Below 202° C./13 Mm.	6	—	—
II. .	202° to 204°	41	0·8815	86·2
III. .	204° to 206°	41	0·8792	93·1
IV. .	206° to 208°	36	—	94·4
V. .	208° to 210°	16	0·8778	94·3
VI. .	210° to 220°	8	—	96·8
VII. .	220° to 240°	5	—	98·8
VIII. .	240° to 290°	7	—	106·8
IX. .	Above 290°	5	—	98·2

The principal fractions (II., III., IV., and V.), which distilled within a very small range of temperature, were colourless mobile oils, and evidently consisted chiefly of a single substance. On comparing the iodine value of the various fractions with that of methyl oleate (85·9), it may be concluded that the four larger ones consisted chiefly of the latter compound, together with a small percentage of the ester of an acid possessing a higher degree of unsaturation, probably methyl linolate. The fractions II. and V. were analysed :—

Fraction II.—(202 to 204° C./13 Mm.).

0·1229 gave 0·3466 CO_2 and 0·1386 H_2O. C=76·9 ; H=12·5,

Fraction V.—(208 to 210° C./13 Mm.).

0·1448 gave 0·4086 CO_2 and 0·1572 H_2O. C=77·0 ; H=12·1,

Methyl Oleate, $C_{19}H_{36}O_2$, requires C=77·0 ; H=12·2 per cent.

Methyl Linolate, $C_{19}H_{34}O_2$, requires C=77·6 ; H=11·6 per cent.

Although the above data indicated that the fractions boiling from 202 to 210° C./13 Mm. consisted chiefly of methyl oleate, it was deemed of interest to ascertain what amount of the methyl esters of saturated acids they contained. For this purpose a portion of the mixed fractions (202 to 210° C./13 Mm.) was hydrolyzed by alcoholic potash, the acids liberated and extracted and then converted into their lead salts by precipitation with lead acetate in alcoholic solution. The lead salts were collected on a filter, washed with alcohol, and finally digested with ether. From the soluble portion, consisting of the salts of unsaturated acids, the acids were liberated, and their iodine value again determined by the Hübl method. This was found to be 98·4, a figure which is only slightly higher than that previously obtained.

The evidence was thus afforded that the liquid acid contained in the fatty oil consisted chiefly of *oleic acid*, together with a small amount of an acid having a higher degree of unsaturation, which is probably *linolic acid.*

II.—Examination of the Alcoholic Extract.

The alcoholic extract, which was a thick, very dark coloured product, was brought into a flask with water and distilled in steam. The distillate contained a small amount of acid, which, after converson into a barium salt, was found to consist of a mixture of *formic* and *butyric acids.*

After the steam distillation the contents of the distilling flask consisted of an aqueous liquid (A) containing a small amount of resinous substance (B) in suspension. These were separated by filtration and subsequently examined.

(A) The Aqueous Liquid.

The aqueous liquid was somewhat turbid, owing to the presence of finely-divided particles of resinous substance which could not be removed by filtration. On shaking it, however. with a little ether the resin was removed, and this was added to the larger portion previously obtained. The aqueous liquid, which was now perfectly clear, had a reddish-brown colour, a strongly acid reaction, and possessed an intensely bitter taste. With alkalies the liquid was rendered much deeper in colour, and with ferric chloride a dark brown colouration was produced. It readily reduced Fehling's solution, and gave a precipitate with tannic acid.

As it was shown in the investigation of the fruit of *Brucea sumatrana* (*loc. cit.*) that an intensely bitter principle could be extracted from the aqueous liquid corresponding to that above described by shaking with chloroform, the same treatment was adopted in the present instance. On repeatedly extracting the liquid with this solvent, however, only a very small amount of substance was removed. This possessed a bitter taste, but could only be obtained in the form of a dark brown varnish, differing in this respect from the corresponding bitter principle from the fruit of *Brucea sumatrana.* On dissolving this product in alcohol and allowing the solution to stand for a long time, a few needle-shaped crystals were deposited, which melted sharply

at 108° C., but these did not possess a bitter taste, and the quantity was much too small for further examination.

The aqueous liquid, which had repeatedly been extracted with chloroform, still possessed a bitter taste, and showed the same behaviour towards reagents as above described. It was treated with a slight excess of basic lead acetate, when a copious yellow precipitate was produced. This was collected on a filter. and washed by the aid of a pump with a little water.

Basic Lead Acetate Precipitate. This was suspended in water, decomposed by hydrogen sulphide, and the mixture filtered. On concentrating the filtrate under diminished pressure a syrupy liquid was obtained, which gave an emerald-green colour with ferric chloride, but no crystalline substance separated from it, even after standing for a long time.

Filtrate from the Basic Lead Acetate Precipitate. This was treated with hydrogen sulphide for the removal of the lead, and the mixture filtered. The filtrate was concentrated under diminished pressure, when it formed a thick, dark brown syrup, which readily reduced Fehling's solution on heating. A portion of this syrup was treated with phenylhydrazine acetate, when it yielded an osazone, melting at 205° C., thus indicating the presence of a large amount of *glucose*.

With the endeavour to separate the bitter principle which still remained in the syrupy liquid, the latter was mixed with purified sawdust, the mixture thoroughly dried, and then successively extracted in a Soxhlet apparatus with ethyl acetate, alcohol, and water. Both the ethyl acetate and alcohol extracts were intensely bitter, but they formed only thick syrups, from which no solid substance could be separated. The final aqueous extract was almost completely devoid of bitterness, and evidently consisted chiefly of sugar.

(B) The Resinous Substances.

The total amount of resinous substance separated from the alcoholic extract, as previously described, was 21 Gm., thus representing about 1 per cent. of the weight of the fruit. It was dissolved in a little alcohol, the solution mixed with purified sawdust, and, after thoroughly drying the mixture, the latter was successively extracted in a Soxhlet apparatus with various solvents. The amounts of extract thus obtained, after drying in a water-oven, were as follows :—

Petroleum (b.p. 35–50° C.) .	extracted	6·2 Gm.	= 29·5	per cent.
Ether	,,	1·5 ,,	= 7·1	,,
Chloroform . . .	,,	3·2 ,,	= 15·2	,,
Ethyl Acetate . . .	,,	3·0 ,,	= 14·3	,,
Alcohol	,,	6·9 ,,	= 32·9	,,
Total . .		20·8 Gm.	= 99·0	per cent.

The petroleum extract formed a dark green, viscid mass. It was hydrolyzed with alcoholic potash, and, after the removal of the alcohol, water was added, and the alkaline liquid extracted with ether. The ethereal solution was washed, dried, evaporated. and the residue treated with alcohol, when a very small amount of a crystalline substance was obtained. This was recrystallized several times from ethyl acetate, when it separated in glistening plates, which melted sharply at 147° C., and afforded the colour reaction characteristic of the *phytosterols*. The alkaline liquid, from which this phytosterol had been abstracted by ether, was acidified with sulphuric acid, and again shaken with ether. This removed a dark green viscous substance, which apparently contained a small quantity of fatty acids.

The extracts obtained by the other above-mentioned solvents were all amorphous, and, although carefully examined, no crystalline substance could be separated from them.

Summary and Conclusions.

In summarizing the results of this investigation it will be seen that the more important constituents of the fruit of *Brucea antidysenterica*, Lam., are the following—

1. A *fatty oil*, amounting to 22·16 per cent. of the weight of the fruit. This oil, on hydrolysis, yielded chiefly *oleic acid*, together with a small amount of an acid having a higher degree of unsaturation, which is probably *linolic acid*; considerable amounts of *palmitic* and *stearic acids*, and a very small quantity of *acetic* and *butyric acids*. It afforded, furthermore, a small amount of a *phytosterol*, $C_{20}H_{34}O, H_2O$ (m.p., 135-136°C.), whilst another phytosterol, melting at 147° C., was obtained from the petroleum extract of the resins.

2. A small amount of free volatile acids, consisting of a mixture of *formic* and *butyric acids*.

3. A quantity of *resinous substances*, corresponding to about 1 per cent. of the weight of the fruit. From these, with the

exception of a small amount of the above-mentioned phytosterol, nothing crystalline could be isolated.

4. A *bitter principle*, or possibly a mixture of such principles, which could only be obtained in an amorphous form.

5. A considerable quantity of amorphous yellow *colouring matter*.

6. A large amount of a sugar, which yielded an osazone melting at 205°C., and was therefore evidently *glucose*.

The constituents of the fruit of *Brucea antidysenterica*, Lam., are thus found to be very similar in character to those of the fruit of *Brucea sumatrana* Roxb ("Kô-sam seeds"), and it may consequently be assumed that the two species possess similar medicinal properties. The bitter principles appear, however, to be contained in relatively larger amount in the fruit of *Brucea sumatrana* than in that of the Abyssinian species, and in view of the difficulty experienced in collecting the fruit of the latter it is not probable that it will acquire a very extended use.

It may finally be noted that the *Pharmacopoeia Nederlandica* (*Editio Quarta*, 1905) has given official recognition to the fruit of *Brucea sumatrana*, Roxb., which is described under the title of "Fructus Bruceæ," and it is there stated that in the Dutch East Indies this is known, among other names, as "bidji makasar" (*grana macasaria*), and "tambara maridja."

The Wellcome Chemical Research Laboratories, London.

GENERAL BUSINESS.

The Bell and Hills Fund.

The President said the next business was the presentation of books from the Bell and Hills Fund, and, after giving a short explanation of the origin of the fund, he called upon Mr. G. S. Woolley, as representing the Manchester Pharmaceutical Association, to accept the books.

The books were as follows:—

U.S. Pharmacopœia.
Sutton's *Volumetric Analysis.*
Greenish's *Food and Drugs.*

Greenish's *Microscopical Atlas.*
National Standard Dispensatory.
German Pharmacopœia.
Caspari's *Pharmacy.*
Hale White's *Pharmacology.*

Mr. WOOLLEY, in accepting what he described as the very gracious gift of the Conference, said he wished their librarian had been present to support him in his expression of thanks. He was looking forward to the great value the books would have in revivifying interest in the library, which he was sorry to say had not been so lavishly used by the youth of that district as they would have liked. Possibly this addition to the library might be the means of stirring up interest in their collection of books.

The PRESIDENT afterwards, as a memorial of his year of office, asked Mr. Woolley to accept, on behalf of the Manchester Association, in honour of Dalton, a print of the well-known picture, "British Men of Science, 1807–1808," in which Dalton was the central figure.

THANKS TO LOCAL OFFICERS.

Mr. W. F. WELLS proposed a hearty vote of thanks to the members of the local committees for their valuable and energetic work. They were all delighted, he said, to see that old hero of pharmacy, Mr. G. S. Woolley, present. Mr. Woolley, he believed, occupied the same position at the last Manchester Conference as he did at the present one. Mr. Kemp and Mr. Pidd had both done their duty well, and last, but not least, the chief cog of the wheel which had worked so harmoniously was Mr. Kirkby, who had been a most genial, courteous, and attentive Secretary. With regard to the work of the ladies, the Conference could not have had a more cordial reception from them. The ladies had done their work admirably.

Mr. W. L. CURRIE seconded the proposition. With the knowledge of those who came from outside he could testify that on no previous occasion had so much time and attention been devoted to the lady visitors as had been given by the ladies of Manchester on that occasion. In fact, everyone concerned in the local arrangements for the Conference had done their best to make it a success. If the success which had attended

it so far should continue to the end, the British Pharmaceutical Conference would have good reason to be pleased with its visit to Manchester in 1907.

The proposition was carried with enthusiasm.

Mr. G. S. WOOLLEY, on behalf of the Local Committee, suitably acknowledged the expressions of thanks, and alluded to the fact that the bulk of the work had fallen upon Mr. Kirkby.

Mr. H. KEMP, in supporting Mr. Woolley, said no Secretary had ever worked as Mr. Kirkby had. All the helpers had worked loyally, indefatigably, and enthusiastically.

Mr. WM. KIRKBY also expressed his thanks for the cordiality with which the vote had been passed.

PLACE OF MEETING FOR 1908.

Mr. W. GILES, as a delegate of the Aberdeen Pharmaceutical Association, gave a most cordial invitation to the Conference to visit Aberdeen for the annual meeting next year. In asking them to accept the invitation, he said he should like to point out that while Aberdeen was not a busy manufacturing centre like that great city of Manchester, nevertheless it had some very important industries, chief of which were granite and fishing industries. There were also the jute, shipbuilding, coal, cabinet, and paper-making industries. Then in regard to the intellectual and scientific aspect of the "Granite City," there was Aberdeen University, of which they were all very proud. They had also art and sculpture galleries, a sea beach, golf course, and every accommodation for receiving the Conference in Aberdeen. It was now twenty-two years since the Conference last visited Aberdeen, and the local pharmacists felt that their turn had come round again. If they accepted the invitation he was sure everything would be done to make the visit enjoyable and successful.

Mr. W. F. HAY said he wished to support Mr. Giles in his invitation that the Conference should visit Aberdeen next year. As had been said, it was twenty-two years since the Conference last visited Aberdeen, and, in the interval, the *personnel* of the Conference had changed to a large extent. There had also been a considerable change in the city of Aberdeen. It was now about three times the size it was twenty-two years ago, and the population had almost doubled. Aberdeen to-day ranked

as the third city in Scotland. It could offer its visitors a much purer atmosphere than Manchester could, and it would give them a hearty welcome. No endeavour would be wanting to make the Conference the success it ought to be when it went to Aberdeen.

Mr. J. P. KAY assured the Conference that there would be no change in the heartiness of the reception Aberdeen pharmacists would give them to that which was given twenty-two years ago.

Mr. W. A. H. NAYLOR moved that the offer be accepted. They all appreciated most highly the cordiality with which the invitation to Aberdeen had been presented to them that day.

Dr. WALSH seconded, and the motion was carried with hearty unanimity.

ELECTION OF OFFICERS FOR 1907-8.

Mr. G. C. DRUCE proposed the names of the following list of officers for 1907-8 :—President, Mr. R. Wright; Vice-Presidents, Messrs. J. Rymer Young, G. Lunan, Dr. J. A. Walsh, Prof. Greenish, Mr. W. Giles, and Mr. F. Ransom; Hon. Treasurer, Mr. J. C. Umney; Hon. General Secretaries, Messrs. E. S. Peck and Edmund White; Hon. Local Secretary, Mr. Wm. Reid, Aberdeen; Executive Committee, Messrs. F. H. Alcock, H. Finnemore, J.P. Gilmour, E. F. Harrison, J. S. Hills, D. L. Howard, W. Kirkby, W. H. Martindale, J. F. Tocher; Auditors, Mr. J. W. Bowen and Mr. W. P. Robinson.

Mr. T. H. W. IDRIS, M.P., seconded the motion, and remarked that Mr. Wright had unparalleled claims to the presidency next year.

The PRESIDENT supported the proposition, and on being put it was carried with acclamation.

Mr. WRIGHT acknowledged the honour which had been paid him. He spoke of the practical value of the Conference, which he thought represented the very life and soul of pharmacy.

CLOSING VOTES OF THANKS.

The PRESIDENT asked the meeting to show their appreciation of the splendid work of the joint Hon. Secretaries and the Treasurer, and this was done in a hearty manner.

Dr. SYMES moved a formal vote of thanks to the President for the able way he had occupied the presidential chair and carried out his various duties.

Mr. G. S. WOOLLEY seconded, and the vote was enthusiastically accorded.

The PRESIDENT suitably replied, and said he should not like the meeting to conclude without saying a few words of thanks to the Editor of *The Pharmaceutical Journal* for providing them with books containing the text of the papers in full and the programme. He himself had found the book most useful.

The Sessions of Conference then concluded.

THE SOCIAL GATHERINGS.

THE RECEPTION.

On Monday evening, July 22, the Lord Mayor and Lady Mayoress of Manchester, Councillor J. and Mrs. Harrop, received the Members of the Conference in the Town Hall—a magnificent building in Albert Square, containing over 300 rooms. There were nearly 900 guests present at this gathering, for which the Lord Mayor had issued invitations to members of the medical profession, members of the City Council and the Local Bench. The guests were received by the Lord Mayor and Lady Mayoress, assisted by the President of the Conference and Mrs. Tyrer, in the Tower Chamber, and the many handsome apartments were thrown open to the visitors. Members of the Conference who had not previously visited Manchester were delighted with the beauty of the splendid portraits in the art gallery and the paintings by Ford Madox Brown, illustrating incidents in the history of Manchester and district, which adorn the walls of the Great Hall, where the Manchester City Police Band played a selection of choice music. The rooms were very effectively decorated, and an elaborate display of coloured lights gave them a most pleasing appearance. Refreshments were served in the Banqueting and Reception Halls, and during the evening Dr. J. Kendrick Pyne played a series of admirable selections on the organ. In the Council Chamber, Mr. Fowler Burton and Miss Ada Ward rendered a number of songs and recitations.

VISITS IN THE CITY AND NEIGHBOURHOOD.

On Tuesday morning, the ladies were taken on a round of visits to various places of interest in the city, including the Royal Institution, the Cathedral, Cheetham Hospital, and the John Rylands Library.

After luncheon on Tuesday a large number of members and

friends were conveyed in cars to the City Electricity Supply Station, and the City Fire Brigade Station, where a display was given under the direction of Chief Officer Baylis. The smartness in turning out and other aspects of fire brigade work greatly impressed the party. At the Municipal School of Technology educational Manchester was seen to splendid advantage. This building, which was opened by the Right Hon. A. J. Balfour, M.P., in 1902, is six storys in height, and covers a plot of ground 6,400 square yards in area. Technical arts of all descriptions are taught, and there are organic and inorganic chemical laboratories, a principal chemical lecture theatre, and laboratories for metallurgy and brewing. Visits were also paid to Messrs. R. Haworth's Cotton Mills, the Acme Spinning Co.'s Mills, and Messrs. S. and J. Watts and Co.'s Warehouse. Here also the visitors found a great deal to interest them.

Reception at the University.

The Whitworth Hall of the University was the venue of a gay and animated gathering at five o'clock on Tuesday afternoon, when the Vice-Chancellor of the University, Mr. Alfred Hopkinson and Mrs. Hopkinson entertained the visitors to a reception and afternoon tea. The host and hostess gave the party a very hearty welcome, and their kindness was much appreciated, the gratitude of the visitors being expressed by Mr. Tyrer in a few words of thanks, with reminiscences of twenty-five years, when Sir Henry Roscoe was on the eve of his appointment as Professor of Chemistry to the then Owens College. Professor Wild also, on behalf of the medical section, welcomed the visitors, and hoped that their visit would be one of profit and interest. He then conducted a party through his department of the University, while Mr. Grier also took a very large party over the pharmaceutical department, which is replete with all appliances necessary for the teaching of materia medica and practical pharmacy, both for medical and pharmaceutical students. The pharmacological laboratory was also visited, and a detailed account of its work was given by Mr. Grier. The pharmaceutical department at the Owens College is spacious, well-lighted, and replete with appliances. Altogether the afternoon was a memorable one.

Grand Concert.

The concert in the Midland Hall on Tuesday night was attended by several hundred members of the Conference and their friends. Songs were rendered by Mr. Fowler Burton, Madame Annie Walker, Mr. Webster Millar, Mr. A. C. Vallance, and Mr. J. H. Franklin. The latter gentleman is an old favourite with pharmaceutical audiences, and those present showed their appreciation of his efforts by their enthusiastic applause. Mr. Olly Oakley, a well-known professional, was very successful with his banjo solos, and the Misses J. and L. Harrison received a hearty ovation for their sweet rendering of a harp and violin duet. The efforts of the artistes in a fantasy in one act entitled "Shades of Night," also met with well-earned applause. The dancing which followed the concert was kept up until two o'clock the following morning.

Garden Party at Salford.

After lunch on Wednesday the members were conveyed to Buile Hill Park, where a reception and garden party was given by the Mayor and Mayoress of Salford (Alderman and Mrs. Frankenburg). This was a strikingly successful function, and the welcome accorded by the Mayor and Mayoress elicited the warm appreciation of the visitors. The beauties of the Park were much admired.

Visit to the Hippodrome.

On the evening of Wednesday a large number paid a visit to Manchester Hippodrome, where the varied and talented programme was received with no small amount of applause.

Excursion to Windermere.

On Thursday, July 25, the members and friends of the Conference went for an excursion to Windermere. The party assembled at Victoria Station, Manchester. Unfortunately, the weather prospects were not promising, and up to an hour after the special train of fourteen saloon carriages had left Manchester rain fell heavily. By the time the Lakeside Station was reached the clouds lightened, and no more rain fell during the remainder of the day. The steam yacht *Swift* was in waiting,

and started immediately after the arrival of the party. A well-printed and capitally illustrated pocket excursion manual was provided and will be kept by everyone who received it as a pleasant and valuable souvenir of the event.

The luncheon was provided in a spacious marquee at Ambleside. The PRESIDENT, in eloquent terms, moved a vote of thanks to the Manchester Pharmaceutical Association and to the several committees who had made and carried out the arrangements so successfully. Their hopes had been fully realized, not only in the great and generous hospitality they had received, but in the happy and glorious day they were now enjoying. The Ladies' Committee had done eminent service, and deserved their special thanks. He commended with a full heart the toast, and ventured to say for all of them that from the bottom of their hearts they wished prosperity to the local association and to the great city of Manchester.

Mr. G. S. WOOLLEY, President of the Manchester Pharmaceutical Association, briefly acknowledged the very kind sentiments. Everything, he said, had gone on smoothly up to the present moment. They were delighted that the day, which had begun so disastrously, had developed so beautifully. They were glad that the arrangements made for the convenience of the visitors had been so well appreciated. Their general secretary, Mr. W. Kirkby, was a master of organization, but he had been assisted by a devoted wife.

Afterwards the company went to the coaches in waiting, and in a few minutes the long array of carriages were being driven to Grasmere via Clappersgate, Skelwith, and Redbank, returning to Ambleside by way of Rydal Water and Fox Home. The return voyage from Ambleside to Lakeside Station was made by steamer. At Lakeside tea was in readiness and was partaken of in ample time to allow the comfortable re-occupation of the saloons for home.

VISIT TO MESSRS. CROSFIELD'S, WARRINGTON.

On Friday morning, a large party left Manchester at 10.30 to visit the extensive works of Messrs. Joseph Crosfield and Sons, Ltd., and the Erasmic Company, Ltd. By the courtesy of the directors the visitors were shown the numerous departments in working order and at 1.30 were entertained to luncheon in the workmen's dining hall. After luncheon an exhibition

of fire drill and ambulance work was given by the fire brigade and physical drill by a squad of the works' volunteer company. In the yard the works' band played a selection of music, in the recreation room the girls employed by the firm gave a gymnastic display, and the choir of mixed voices entertained the visitors with very enjoyable singing. Subsequently tea was served in the roof garden and the girls' dining room, and about five o'clock the visitors departed to Manchester and London, having spent a very interesting and enjoyable day.

INDEX

A.

B.

C.

E.

G

H.

I.

J.

K.

L.

M.

N.

O.

Q.

R.

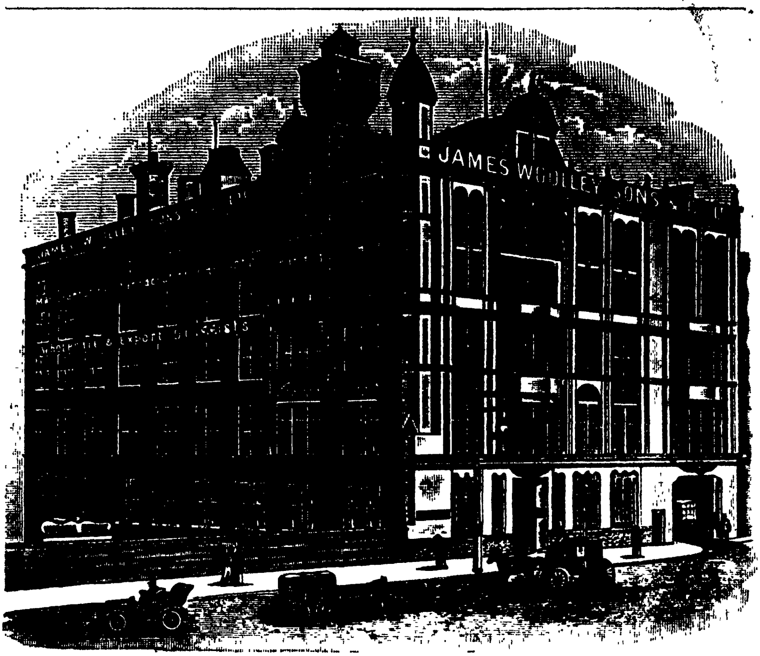
S.

V.

W.

X.

ADVERTISEMENTS

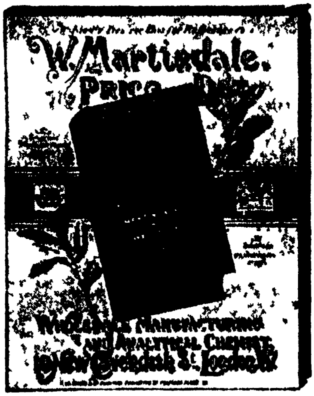


W. MARTINDALE,

WHOLESALE & EXPORT CHEMIST.

Telegrams
"Martindale,
Chemist, London

MONTHLY PRICE LIST (Up-to-date. We hold stock of ALL NEW PREPARATIONS) post free.



Telephones
1797 Paddington
4688 Gerrard

We supply the Trade with Chemicals, Drugs, Galenicals, and Surgeons' and General Sundries at moderate prices. Quotations per return post

10, New Cavendish Street, London, W.

Animal Extracts

WILLOWS, FRANCIS, BUTLER, and THOMPSON, Ltd.

40, ALDERSGATE ST., LONDON, E.C.

C. R. HARKER, STAGG & MORGAN, LTD.

Over 100 per cent. profit to the Chemist.

THE BEST AND MOST RELIABLE

HAIR DYE

on the market, which is in ever increasing demand. Sells readily and

Once used—Always used.

Brings constant repeat orders and becomes a valuable source of additional profit in any business. Attractively turned out in a range of varying styles. Exclusive titles and designs can be reserved for large consumers. Supplied either as LAURENCE'S or under CHEMIST'S OWN NAME. Write now for samples and specimens of designs.

TRUE TO NAME. TRUE TO NATURE.

In nine shades:—RAVEN BLACK. BLACK. DARK BROWN. BROWN. MEDIUM BROWN. LIGHT BROWN. CHESTNUT. AUBURN. GOLDEN BLONDE.

Prices—1/6 size, **8/-** per doz. 3/6 size, **18/-** per doz.

With a Small Brush in each case, 1s. a doz. extra.

DECIDE TO TAKE THIS UP AT ONCE.

C. R. HARKER, STAGG & MORGAN, Ltd.,

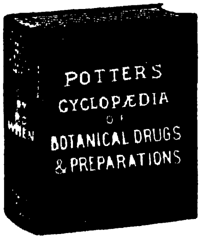
WHOLESALE AND EXPORT DRUGGISTS,

Devon Wharf, Emmott Street,
Mile End, London, E.

Telephone No. 215, East. Telegraphic Address: "Eduloine," London.

POTTER'S

Cyclopædia of Botanical Drugs.



Nearly 3,000 references of all-important Herbs, Roots, Barks, Flowers, Seeds, Gums, and Balsams, giving doses and preparations.

Retail, 2s. 6d. nett.
Wholesale, 2s. nett.

A STANDARD BOOK OF REFERENCE.

POTTER & CLARKE, LTD., Wholesale Druggists,
60, 62, 64, Artillery Lane,
LONDON, E.

J. H. HAYWOOD,

Castle Gate, Nottingham, and 16, Silver Street, Wood Street, London.

ESTABLISHED 1838.

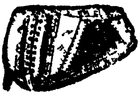
Superior Quality ELASTIC STOCKINGS and Appliances with and without seams for Varicose Veins, Obstetric Binders, Monthly Belts, Breast Supports, Trusses, Ladies' Belts, Chest Expanding Braces, Lint, Wool, Bandages, etc.

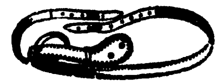
Water and Air-proof Goods.

SURGICAL INSTRUMENTS.

ELASTIC APPLIANCES and TRUSSES

For Special and Difficult Cases made carefully to order.





COUGHS.—American Cherry Pectoral,

For the Cure of Coughs, Colds, Influenza, Hoarseness, Bronchitis, Incipient Consumption, and affording the greatest relief in advanced stages of Disease.

In Bottles at 1s. 1½d., 2s. 9d., 4s. 6d., and 11s.

Also CHERRY PECTORAL LOZENGES, for Coughs, etc. 1s. 1½d. and 2s. 9d.

BRADLEY & BOURDAS, 48, Belgrave Road, and 6, Pont Street, Belgrave Square, London, S.W., *and may be had of all Chemists.*

Telegraphic Address—"Bourdas, London." Telephone—721, Westminster.

PATA. **WOODS'** PATA.

Areca-Nut Tooth Paste.

A Perfect Antiseptic Dentifrice. Sold Everywhere.

6d. and 1s. Pots. Also Collapsible Tubes, 6d. and 1s.

SPECIAL TERMS FOR £5 ORDER.

W. WOODS & SON, CHEMISTS, PLYMOUTH.

DR. RENNER'S

Establishment for Vaccination with Calf Lymph,

75, Upper Gloucester Place, LONDON, N.W.

THE OLDEST ORIGINAL CALF VACCINE INSTITUTION IN THIS COUNTRY.

Prices of Calf Lymph (Glycerinated).

"Large" Tubes ... ... 2s. each, or 3 for 5s.
"Small" ditto ... ... 1s. each, or 3 for 2s. 6d.
"Half" ditto ... ... 8d. each, 2 for 1s., or 6 for 2s. 6d.

VIALS.

(Concentrated Glycerized Pulp.)

"Large" (sufficient for 60-80 Vaccinations) .. ... 10s. 6d. each.
"Small" (half) .. .. 5s. 6d. each.

RAIMES & CO., YORK

(SLINGER & SON. Incorporated 1899),

Wholesale Druggists & Manufacturing Chemists.

Specialities:
LIQ. VIOLÆ CONC. 1.15.
SYR. RHŒADOS.
BRONCHIAL BALSAMIC WAFERS

PROPRIETORS OF

SLINGER'S NUTRIENT SUPPOSITORIES.

Quinine Wine, B.P.

BUYER'S OWN NAME ON LABEL

Orange Wine.

In strict accordance with the requirements of the British Pharmacopœia.

The above both Perfectly fermented Wines.

LIME JUICE CORDIAL.

LEMON SQUASH. LEMON SYRUP.

Only the Finest Quality.

G. Y. HOME & CO.,

RECTIFIERS AND BRITISH WINE MAKERS, BRISTOL.

ESTABLISHED 1841.

FULL ILLUSTRATED LISTS FREE.

RUBBER STAMPS

Chemists' Stamps, Seals and Stencils a Speciality.
Window Ticket Making Sets.

C. D. RICHFORD,
8 & 9, SNOW HILL, LONDON, E.C.
Established 26 Years.

FREDERICK FINK & CO.,

10, 11, MINCING LANE, LONDON, E.C.

SPECIALITIES:

Hand-picked Gum Arabic and Gum Arabic in sorts, Gum Tragacanth, Pure Beeswax and Honey.

ALFRED WHITE & SONS,

MANUFACTURING CHEMIST,

Established 1775.

Manufacturers of Acids,—Æthers,—Sp. Æther. Nit.,—Sp. Ammon. Arom.,—Liq. Ammon.,—Soldering Solution,—etc., and preparations of Alum,—Animal Charcoal,—Antimony,—Baryta,—Bismuth,—Strontia,—Tin,—Zinc,—etc.

ALLEN STREET, GOSWELL ROAD, E.C.

(Late Castle Street, Saffron Hill, E.C.)

WORKS:—WEST DRAYTON, MIDDLESEX.

Telegraphic Address:—"ETHER METHYLATED, LONDON."

12/- doz. **"OTHNIEL" BRAND (REGISTERED).** **12/- doz.**

The "**OTHNIEL**" brand of Capsules and Perles is unsurpassed both as regards quality and the beautiful manner in which the goods are put up, the very best of everything being used throughout; and being made **by hand in one piece,** instead of by machinery in two pieces, may be shipped all over the world without any fear of leakage.

Both the Capsules and Perles are made from the very finest white gelatine, and are quite transparent; the contents may therefore be plainly seen.

A gross costing £7 4s. od. sells for £18 os. od. (2/6 bottle) showing a Net Profit of **£10 16s. 0d.**

As the **specialities** introduced by us are imitated by other houses, please specify our firm distinctly.

"The 'B.B.S.' Brand are ***the*** 'Perles' of the land."—*Chemist and Druggist*, December 14, 1901

Sole Proprietors,

Baiss Brothers & Stevenson,

Limited,

Manufacturing Chemists, JEWRY STREET, LONDON, E.C.

Highest Award, "GRAND PRIX," PARIS, 1900.

MANUFACTURERS OF

Morphine and Codeine

AND THEIR SALTS

ERGOTIN.
CANTHARIDIN.
SALICIN.
ALOIN.
APOMORPHINE.
CAPSICINE.
GINGERINE.

T. & H. SMITH

LIMITED.

21, Duke Street, EDINBURGH; 22, City Road, LONDON, E.C.; 37, Washington St., GLASGOW.

United States Agency—

GUSTAV MARTIN

38, PEARL STREET, BOSTON.

CHLOROFORM.
Absolutely PURE, and answers all Official Tests
CHLOROFORM RECT.
From Alcohol
JALAP RESIN.
SCAMMONY RESIN.
SCAMMONIN.
JALAPIN.
Inventors and Sole Manufacturers of the
TELA VESICATORIA
or Blistering Tissue
By far the most efficient Cantharides Vesicant in existence.

INDEX TO ADVERTISEMENTS

Printed ... the Selwood Printing Works Frome and London